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Volume Thirty-six Number Nine

ADVENTURE

- 12 EYEBALL TO EYEBALL WITH A WHALE** /HOWARD HALL

PHOTOGRAPHY

- 20 SDM'S NIKONOS COURSE** /GERI MURPHY
42 FRESHWATER CAMERA TECHNIQUES /JACK BISSELL
46 HYPERTECH VIDEO HOUSING /JACK MCKENNEY
50 SDM'S U/W VIDEO COURSE /JIM AND CATHY CHURCH

OVERSEAS TRAVEL

- 24 STINGRAY CITY** /GERI MURPHY
67 WORLD-CLASS CRUISERS /CARL ROESSLER
74 SEA FEVER /STEPHEN FRINK
90 DEL MAR AQUATICS AT LA CEIBA HOTEL /MARK M. LAWRENCE
92 BRAC AQUATICS/BRAC REEF RESORT /MARK M. LAWRENCE
95 DIVING NEWS FROM DOWN UNDER /GERI MURPHY

DIVE EQUIPMENT

- 34 DACOR WARM-UP SUIT** /JIM WALKER
52 TEKNA'S DIGITEK CONSOLE /GERI MURPHY
56 SKINNYDIPPER DIVE COMPUTER /GERI MURPHY
62 SEQUEST CAPRI WETSUIT /BONNIE J. CARDONE
64 U.S. TECH VANGUARD SPORT REGULATOR /ERIC HANAUER
136 TABATA'S LIBERATOR BCJ /BONNIE J. CARDONE

BOATING

- 38 YAMAHA 25 HP OUTBOARD** /ERIC HANAUER
40 AQUASPORT 281 FF /GREG JOHNSTON

THE GOURMET DIVER

- 44 LINGCOD** /BRUCE WATKINS

LOCAL DIVING

- 100 DIVERS DEN OF KEY LARGO** /GREG JOHNSTON

WRECK DIVING

- 106 SEARCH FOR DOG HOLE SCHOONERS** /E.R. CROSS

MARINE LIFE

- CALIFORNIA DIVER BAGS GIANT SQUID** /HILLARY HAUSER

COLUMNS

- | | |
|-----------------------------|-----------------------------------|
| 14 WRECK FACTS | 47 TECHNIFACTS |
| 30 FISH OF THE MONTH | 170 I LEARNED ABOUT DIVING |
| 32 DIVING MEDICINE | |

DEPARTMENTS

- | | |
|-----------------------------|--------------------------------|
| 17 SCUBA QUIZ | 79 ADVERTISER DIRECTORY |
| 28 CALENDAR | 163 DIVER'S DIRECTORY |
| 29 DIVE VIDEO REVIEW | |

COVER

Ron and Kathie Kipp feed a southern stingray at Stingray City off Grand Cayman Island. A family of these creatures lives at this site and has been trained by divemasters to take handouts. For more see page 24. Photo/Geri Murphy.

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Stepping out in Cozumel/Page 90



Eye-deal encounter?/Page 12



Pure pleasure/Page 74

Different strokes/Page 24



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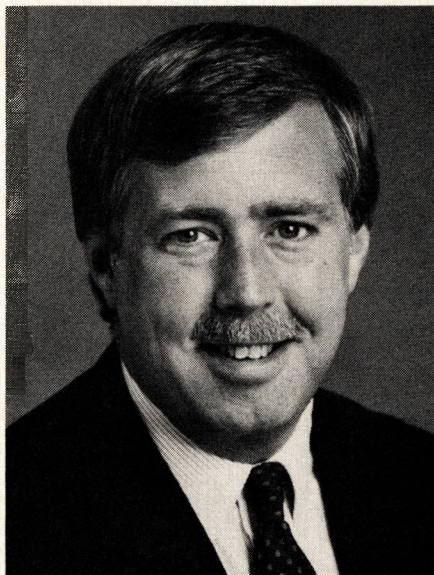
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SDM Editorial

BY BILL GLEASON



THE CHALLENGE OF CHANGE

how to do it safely. This is going to be a profound change, equalled in magnitude only twice in the 40 odd year history of recreational diving.

The first profound change occurred when Cousteau introduced the Aqua-Lung in 1943. This combination of a compressed air tank and demand regulator gave us the opportunity to visit the U/W world with an individual air supply. With this technology came change, and conflict. Questions of safety and government intervention were raised. And, over 20 years, the people of the U.S. slowly came to accept diving as a pastime, even if they did feel it was only for hearty, adventurous and slightly crazy folks.

The second profound change occurred over several years in the '60s. Buoyancy compensators and quality dive education became common. To understand just how significant this change was, you must realize that when BCs were introduced the majority of the dive community felt they were basically worthless. That's because these critics all learned to dive without them. But the farsighted realized that new students were much more comfortable and safe with BCs. The change occurred slowly, but BCs and pressure gauges (also scoffed at when introduced) became the most significant change in diving in 20 years. Education was the key to this change. As more new students learned, the accident rates were drastically lowered, and diving became much safer. When safety improved, less hearty, less adventurous, slightly less crazy men and even some women got to share the excitement of diving.

During the 70s and 80s, modifications and great improvements were made to basic dive gear, making it even easier to learn to dive. Education and certification became the industry standard and diving became possible for just about any healthy adult. Only one last snag remained: You still had to learn the U.S. Navy tables, a process that confuses and even scares some would-be divers.

The new computers will change the

way we dive and the way we teach diving. They are too good of an idea to fade away because they make diving easier.

But, if past history prevails, these positive changes may take much longer than necessary. Change always poses a challenge and dive computers are no exception. The specific challenges are to:


Equipment manufacturers—To continue research and development to give divers the best possible and most reliable dive computers, and to manufacture and sell so many of them that the price is within easy reach of the average diver. This is already beginning to happen, but the sooner every diver has one, the safer diving will become.

Certification Agencies—There is a big challenge to our dive instructors and educators. Do we abandon the tables and teach computers? Do we teach both? These are very difficult challenges, but if certification agencies take a leadership position in promoting the safe use of computers, diving will become easier and a lot more fun!

Dive Resorts—Aboard dive boats, half the divers have computers and half are using conventional tables. What is the divemaster to do? Should divers with computers be forced to use the tables? This is a big challenge, and SKIN DIVER would be delighted to see resorts develop concrete policies so traveling divers will know what to expect.

Let's begin working on these challenges today. A new era of diving freedom has begun, and as an industry, we should move quickly to help divers adjust to this marvelous change.

And divers: Remember you, too, are faced with a challenge. Any increase in freedom usually has increased responsibility as well! Use these new computers wisely and conservatively and build in safety margins for yourself.

In five years the mark of the veteran diver may be that he or she is the only person on the boat who still uses the tables. The rest of us will have found a better way! 

A new wave of high-tech equipment is quietly making profound changes in the way we dive. A few years ago, several young entrepreneurs started a company called Orca Industries, manufacturing a dive computer called the Edge. They claimed it would calculate multilevel dive exposures and provide us with accurate and reliable no-decompression information. Those wearing the Edge would not need to "dive the tables," could dive more frequently and stay down longer than those using U.S. Navy tables. And, Orca said this would be safe. Critics scoffed at these claims and most dive equipment companies waited to see if the new computer would work.

It worked. Thousands of divers have successfully used the Edge, and each of them soon became addicted to his/her dive computer. I've logged 200 dives with mine and I look back with amusement at all the bottom time I've lost in great locations using the Navy tables. News of the success spread slowly. Now, in 1987, many manufacturers are selling all sizes, shapes and colors of dive computers. SKIN DIVER tests them all and is currently reporting on a different model each month. Most divers still have not made a dive with a computer. But they will. It may be 1988 or 1989 before you try one; but once you do, you'll never want to dive without it again. These instruments are going to change the way we dive and we are going to rely on a computer to tell us

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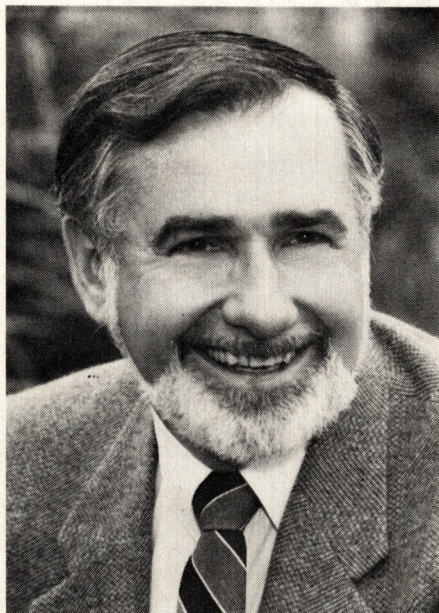
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SDM Editorial

BY PAUL J. TZIMOULIS



ASCENT RATE— THE SLOWER THE BETTER

divers have been making their ascents at this speed or perhaps 10 to 20 percent faster. The same problem exists underwater as on our nation's highways. We seem to push everything to the max.

Now come the startling facts that indicate sport divers may be ascending dangerously fast. The manufacturers of dive computers have clearly focused on the ascent rate problem by taking two important steps:

- 1) More than 71 percent of the current models advocate ascent rates slower than 60 feet per minute.

- 2) Several computers have built-in alarms that will warn the diver if he/she is exceeding the maximum ascent rate.

Why the sudden change in attitude toward ascent rates? Basically, these new dive computers are the result of civilian research and development rather than a military project. The goals are different and, therefore, the approach is different.

Here are just a few of the problems facing computer manufacturers:

- 1) Decompression tables designed for sport divers must cope with a far wider spectrum of physiology and physical fitness. These tables must be equally safe for a 20 year old college student or a 50 year old business executive.

- 2) Decompression tables and ascent rates for sport divers cannot afford the bends incidence (less than five percent) that occurs with the U.S. Navy tables. Safety and product liability are a major concern for computer developers.

- 3) Current research in decompression procedures shows a greater occurrence of silent bubbles at the 60 foot per minute ascent rate than originally thought.

The architects of these new dive computers and the related no-decompression tables are convinced rate of ascent could be a key contributing factor to bends accidents and gas embolisms.

Curious about the reasons behind the slower ascent rates, we contacted the manufacturer of the two dive computers advocating the most drastic reduction in ascent speeds.

Orca has designed both its Edge and SkinnyDipper computers to operate on three different ascent speeds for different depth zones:

60' to surface	20 ft./min.
120' to 60'	40 ft./min.
200' to 120'	60 ft./min.

Developer Craig Barshinger told us the theory behind the Orca decompression model and related ascent rates. In simplified terms, the problem with ascent rates lies in the ultra fast tissues of the body such as blood plasma. These tissues absorb nitrogen extremely rapidly. For example, a one minute dive to 120 feet is enough time to cause oversaturation of the blood plasma and possible silent bubbles if the ascent rate is too fast.

While nitrogen will come out of the blood plasma just as fast as it goes in, the body's circulatory system and lung alveoli cannot handle this rapid off-gassing. The end result is "fizzing" in the blood plasma. Microscopic bubble nuclei begin appearing in the bloodstream. These tiny bubbles in divers' blood have been positively confirmed during pressure chamber and open water experiments using Doppler ultra-sonic bubble detectors. Large numbers of silent bubbles have occurred even at simulated ascent rates as slow as 30 feet per minute. They are called silent bubbles because they do not cause pain or noticeable bends symptoms. Most of them dissipate in time and were once thought to leave no harmful residual effects. However, this is not the case in repetitive dive situations.

Once the bubble nuclei form, the body treats them as foreign objects—much like germs, viruses, etc. Bubble nuclei cause platelet activation, the precursor to blood clotting. The nuclei experience "sheathing" the coating of the bubble's surface with blood plasma proteins. These bubbles are now harder (and take longer) to dissolve in the bloodstream. Surface interval off-gassing is slower.

During subsequent repetitive dives, the silent bubbles begin piling up until a bends accident occurs. The actual bends hit might happen on the most innocent dive—one that is well inside the no-decompression limits.

In essence, every dive, no matter how brief, is actually a decompression dive. A no-decompression dive is simply a dive that requires no decompression stops because decompression is completed during ascent.

The best way to reduce bends risk is to slow down the ascent rate, thus allowing the body *sufficient time* to off-gas the nitrogen via the lungs. Never let the silent bubbles get started.

In order to do this, Orca redistributed
(Continued on Page 156)

This year's introduction of a whole new batch of dive computers has caused us to take a hard look at ascent rates. Of the seven different computer designs on the market, five are advocating maximum ascent speeds that are *much slower* than 60 feet per minute.

Have we been coming up too fast all these years? Does a slower ascent rate make a difference in avoiding the bends? Are the computer scientists and engineers trying to tell us something?

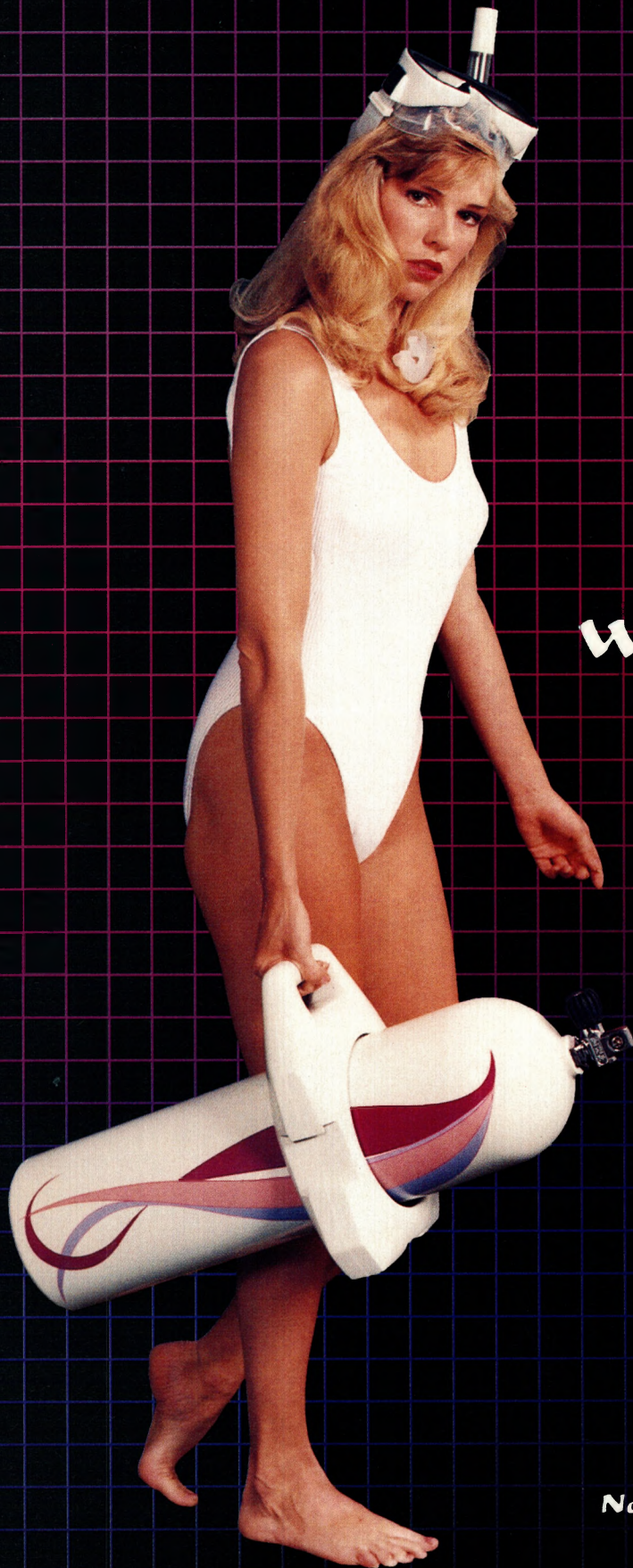
Before answering these questions, let us review the background of sport diver decompression in the U.S. In the beginning, instructors adopted the U.S. Navy tables and procedures because they were the only game in town. For more than 35 years, these procedures have been the standard, even though they were never designed for sport diver use. The U.S. Navy tables have become so ingrained that many divers are not aware that other (quite different) tables are used in foreign countries. During the past 35 years instructors have stressed adherence to three basic U.S. Navy no-decompression diving principles:

- 1) Do not exceed the safe diving depth limit of 130 feet.

- 2) Do not exceed the no-decompression time limits specified for depths in 10 foot increments (40 to 130 feet).

- 3) Ascend at 60 feet per minute.

Since the U.S. Navy said to ascend at 60 feet per minute, sport divers accepted this as the established speed limit. And, human nature being what it is, most sport



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EYEBALL TO EYEBALL WITH A 40 TON WHALE

There is a feeling among many wildlife enthusiasts that whales and dolphins are universally benevolent creatures; that their massive brains—in some species equal to or greater than our own in size and complexity—are less subject to the violence and stupidity that often tarnishes our species. Some believe these animals recognize humans as other creatures of intellect and, in some way, we share a cognizance of life beyond the laws of survival that govern the less complicated forms within our two worlds. Well, perhaps. But, it may be that in our loneliness and hunger to understand ourselves and the fundamental questions of existence that elude mankind, we have mistakenly assumed that whales are something more than wild creatures struggling to survive in a hostile environment.

There are many levels of the “gentle giant” ideology. Philosophies holding that cetaceans are intelligent and, therefore, benevolent are certainly harmless enough most of the time. And, in fact, the growth of these ideologies at all levels has contributed greatly toward saving many species of whales from almost certain extinction. However, in the case of a diver swimming U/W toward an animal several hundred times his/her size, such assumptions can be dangerous. The memory of one such encounter still raises the hairs on the back of my neck and produces a distant pain in my left arm and shoulder within bones that have never quite mended properly.

The accident occurred as a result of circumstances somewhat more com-
(Continued on Page 126)

TEXT AND PHOTOGRAPHY BY HOWARD HALL



Right: A gray whale rises, open-mouthed, through kelp. Above: A close-up of the eye of a gray whale. Howard Hall saw a similar sight just before he was struck by the whale's flukes. Was the attack motivated by fear?



"Cheer, cheer for old Notre Dame!" That's what Tom Russell, class of 1956, is doing. He is also cheering for diver Tom McCall, Ft. Lauderdale, Florida who scooped a nostalgic relic from the sands of the Sunshine State. Ft. Lauderdale is *Where the Boys Are*. It's also where Russell lost his then-new Notre Dame class ring while frolicking in the surf near the intersection of Las Olas Boulevard and the beach.

"It was right in front of the Elbow Room," Russell recounts, "a small bar that is still a hangout for college students. I was frantic when I lost it because it was

citing than retrieving beer can tabs, bobby pins and brassiere hooks. I sent the initials, T.C.R., and the date inscribed, 1956, to the Notre Dame alumni office, which carried the ball from there."

The alumni office found Thomas Connor Russell in the yearbook then notified McCall, who mailed the ring to its owner. "I sent Tom a thank you letter telling him I still couldn't believe it," Russell says. "McCall found it buried in the sand smack dab in front of the Elbow Room where I used to swim everyday during spring break, 1956. It made me feel like a kid again, sort of the Rip Van Winkle of

reveled in nostalgia at the first annual Sharkhunters convention held in Key Largo, Florida. The Sharkhunters, headquartered in Chicago, is a club organized in 1983 by diver Harry Cooper, who wanted to preserve the history of German U-boats in World War II.

As the years passed, Cooper was joined by other U-boat enthusiasts in the U.S. and overseas, including former captains and crews of the *unterseeboots*. Fifteen of the 50 conventioners were former German submariners. Hans-Georg Hess, who commanded *U-995* during the latter part of the war, came to Key Largo from Hanover, Germany. At 23, he was his country's youngest U-boat commander. The *U-995* is preserved as a memorial at Kiel, Germany, one of only two surviving German U-boats. The other, the *U-505*, is a permanent exhibit at Chicago's Museum of Science and Industry.

Hans Gobeler and his wife Erika came to the convention from their home in Elkhart, Indiana. He was a petty officer aboard the *U-505* for two years until it was captured by a U.S. naval task force off the Cape Verde Islands in June 1944. Gobeler remained a prisoner of war until December 1947.

Although some of the nostalgia was sad: allied shipping sunk, U-boats depth-charged and men from both sides missing in action, Georg Hogel brought some humor to the gathering. A radio operator aboard the *U-30*, he said his U-boat was the first to enter the war. "We were the first to fire a torpedo at what we thought was the enemy," Hogel chuckled. "But we soon discovered we had only destroyed a huge rock shaped like a ship!"

Harry Cooper's statistics revealed the German Navy launched approximately 1,200 U-boats prior to and during WW II. About 39,000 sailors served aboard them, but less than 7,000 survived the war. The 15 survivors who attended the convention were happy to help Harry preserve as much of the history of the *unterseeboots* as possible.

On numerous occasions I have written about shipwreck explorations by Gary Gentile, Philadelphia, Pennsylvania. Gary has made more than 700 open water decompression dives. He has also published articles on wreck diving safety, instruction and artifact preservation.

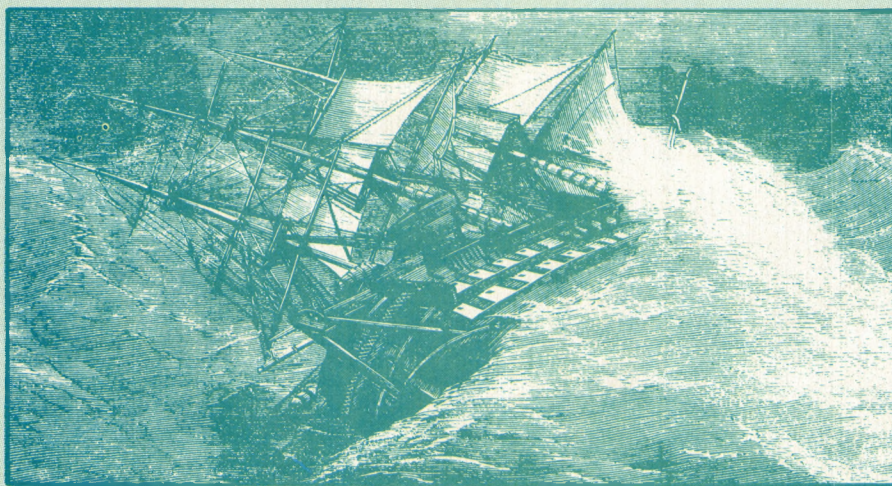
When Gary applied for a permit to dive the Civil War ironclad, *USS Monitor*—sunk approximately 16 miles southeast of Cape Hatteras, North Carolina—he was fed more bureaucratic denials than the President dished out during Iran-scam. Gentile made it very clear he simply wanted to dive the vessel and photograph it. National Oceanographic and Atmospheric Administration officials asked for everything but Gentile's underwear size in attempts to lose him in a labyrinth of government redundancy.

(Continued on Page 148)



photos/courtesy Harry Cooper

From left: Kurt Baberg (*U-618*), Harry Cooper, Hans-Georg Hess (*U-995*), Gerd Thater (*U-466*), Herb Spohr. Left: Harry Cooper on the *Benwood*.



Wreck Facts

BY ELLSWORTH BOYD

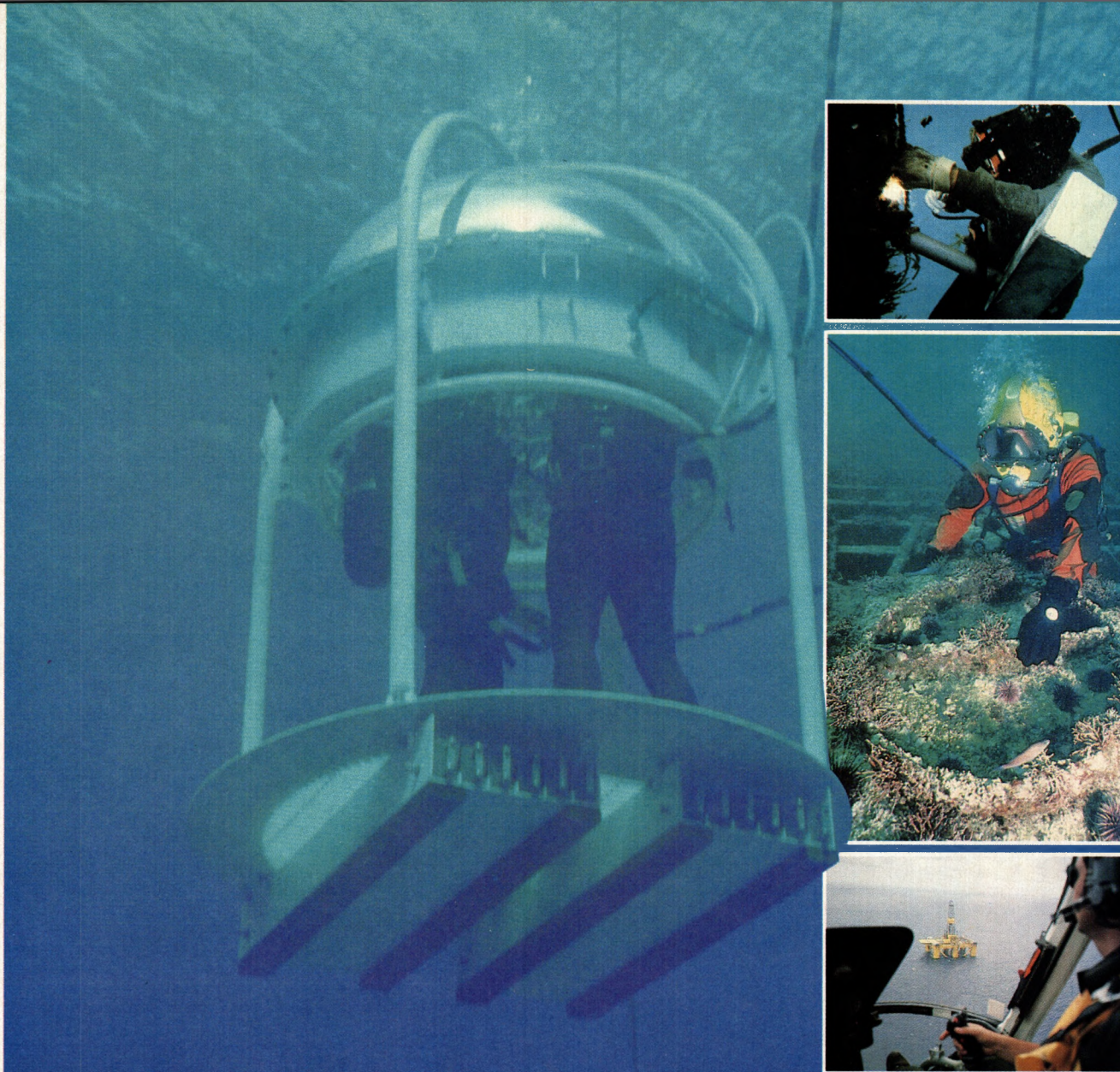
new and I hadn't been wearing it very long. There wasn't much to cheer about when I returned to Indiana."

But Tom McCall, an avid shallow water diver, changed all that—31 years later! Using a metal detector and a wooden scoop in only three feet of water, he combed the area where college kids still romp. "It was a pleasant discovery," the retired businessman said, "a lot more ex-

South Bend, Indiana."

The best part of the story is that Tom doesn't have to give the state of Florida a cut of his treasure recovery! (Thanks to Dave Gentry, Van Nuys, California for the Daily News Clipping about the ring. Gentry was a Ft. Lauderdale lifeguard from 1953 to 1958, guarding the Elbow Room beach on many occasions.)

Historians, divers and submarine buffs



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Scuba Quiz

Category: Environment

Topic: Lake Diving
By Dennis Graver

America's "Middle Coast" describes all the lakes in which freshwater divers find pleasure. Since most diving takes place in the oceans, there is much more written about ocean diving. There are many things divers need to know about lakes, however, such as seasonal changes. This quiz will test your knowledge of these changes. Compare your answers with those found on the following page.

Match the following terms with the definition that best describes them. There are more terms than there are definitions.

1. Thermocline _____
2. Epilimnion _____
3. Hypolimnion _____
4. Isothermus _____
5. Homothermus _____
6. Limnology _____
7. 39°F _____
8. 32°F _____

- A. All water at the same temperature
- B. Layer of water below thermocline
- C. Layer of water above thermocline
- D. Abrupt change in water temperature
- E. Temperature of maximum density
- F. Study of fresh water

9. The best season for diving in most lakes is:

- ☐ A. Late spring
☐ B. Summer
☐ C. Early winter
☐ D. Early spring

10. The majority of time the temperature at depths greater than 60 feet in lakes is:

- ☐ A. 36°F
☐ B. 39°F
☐ C. 41°F
☐ D. 43°F

11. Water temperature is most likely to be the same from the surface to the bottom in lakes during:

- ☐ A. January
☐ B. March
☐ C. June
☐ D. November

12. Overturn of water within a lake occurs during:

- ☐ A. Spring
☐ B. Summer
☐ C. Fall
☐ D. A and C

13. During the summer months fish are most likely to be found in lakes:

- ☐ A. Above the thermocline
☐ B. Below the thermocline
☐ C. At the thermocline
☐ D. At all depths

14. The greatest hazard to lake divers is:

- ☐ A. Hydrogen sulfide
☐ B. Entanglement
☐ C. Sediment
☐ D. Cold

15. Water visibility is often poor in lakes during the summer owing to:

- ☐ A. Dense growths of phytoplankton above the thermocline
☐ B. Dense growths of phytoplankton below the thermocline
☐ C. Pollution
☐ D. Both A and C

16. Mixing of surface and bottom waters within a lake is caused primarily by:

- ☐ A. Changes in water temperature
☐ B. The earth's rotation
☐ C. Wind
☐ D. Both A and C

17. Cold surface water in a lake during summer months is most likely the result of:

- ☐ A. Strong offshore winds
☐ B. Strong onshore winds
☐ C. Cold water flowing into the lake
☐ D. An extended period of overcast days

18. A reverse thermocline is most likely to occur in a lake during the:

- ☐ A. Spring
☐ B. Summer
☐ C. Fall
☐ D. Winter

19. Annual changes in lakes can best be summarized as:

- ☐ A. Heating and stratifying plus cooling and mixing
☐ B. Cooling and stratifying plus heating and mixing
☐ C. Minimal owing to thermal stratification
☐ D. Unpredictable

Scuba Quiz

Answers: Lake Diving.

1. Thermocline

D. Abrupt change in water temperature

2. Epilimnion

C. Layer of water above thermocline

3. Hypolimnion

B. Layer of water below thermocline

4. Isothermus

A. All water at the same temperature

5. Homothermus

A. All water at the same temperature

6. Limnology

F. Study of fresh water

7. 39°F

E. Temperature of maximum density

8. 32°F

No definition given.

9. D. Early spring. From about February through April water temperature in a lake is the same throughout (isothermus). Oxygen is available at all depths. Plankton populations are low. Fish are distributed randomly. Visibility is usually good. This is often the best season for diving.

10. B. 39°F. Fresh water is most dense at 39.2°F. Water is lighter when it is either warmer or cooler than this. During thermal stratification in both the summer and winter months, the water at the bottom of the lake remains at the temperature of maximum density.

11. B. March. The spring overturn of lakes occurs between February and

April. During this period the water profile is the same temperature from the surface to the bottom. There is a second overturn during the fall, but this occurs prior to November. The overturns carry oxygenated water to the bottom of the lake.

12. D. A and C. In the spring, wind sets the water in the lake into motion and an isothermal condition exists. In the fall, the surface waters are cooled until they equal those of the depths. The water in the lake is then mixed by the wind again. Thermoclines are formed in the summer because the surface water is heated faster than the wind can mix it.

13. A. Above the thermocline. The hypolimnion stagnates in most lakes during the summer. Eutrophication becomes prevalent, depletes the oxygen and creates toxins. This causes fish to seek refuge in the epilimnion. During isothermal conditions fish may be found at all levels.

14. D. Cold. Hypothermia is silent and dangerous. The low water temperature at depths in lakes quickly lowers the critical core temperature of divers. Even on the hottest of days, a full, thick wetsuit is required for those who venture below the thermocline. Cold, dark water containing hydrogen sulfide

from the eutrophication process can cause alarm when it comes in contact with the face during mask clearing.

15. D. Both A and C. Phytoplankton (microscopic plants) often becomes dense during the summer months owing to the warm surface water and the sunlight. This condition can be aggravated by the introduction of nutrients, which act as fertilizer. Man's activities are often the source of the nutrients. Light penetration can be literally stopped in only a few feet of water during a plankton bloom.

16. D. Both A and C. Changes in water temperature cause changes in the density of the water. When the surface and bottom temperatures are equal, the wind can then mix the water throughout the lake. The earth's rotation only affects the direction of water movement within a lake. The Coriolis effect does not cause mixing of the waters.

17. A. Strong offshore winds. A wind of sufficient velocity blowing offshore for a sustained period will cause surface water to flow away from shore. Colder water will flow up from the bottom of the lake to replace the water blown away from shore. If the wind conditions persist, the entire water column can reach a cold isothermal condition, even during summer.

18. D. Winter. A reverse thermocline means the water above the thermocline is colder than the water below the thermocline. Because the water at the bottom of the lake is at 39°F, it is actually warmer than the surface water, which is near freezing. The spring overturn is initiated when the surface water is warmed until it is also 39°F.

19. A. Heating and stratifying plus cooling and mixing. The entire pattern of annual changes in a lake should be obvious by now. The surface water is warmed in the spring and early summer until it is warmed faster than it can be mixed. The water then stratifies and forms a thermocline until the fall, when the surface water cools. Mixing then occurs until the surface water becomes colder than the water at the bottom.

Experienced lake divers know that the seasonal patterns described in this quiz are not the same in all lakes. The patterns are affected by geographical features, the depth of the lake and other factors. Data such as water temperature, visibility, fish activity, etc. should be logged so the annual pattern of frequently dived lakes can be determined. This can lead to more enjoyable, safer dives.

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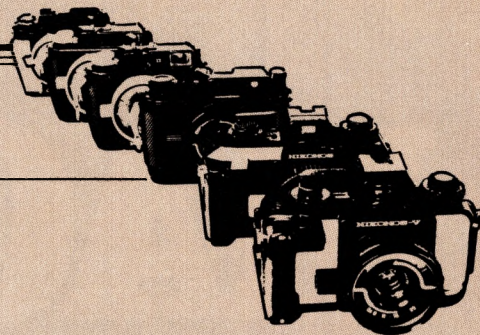


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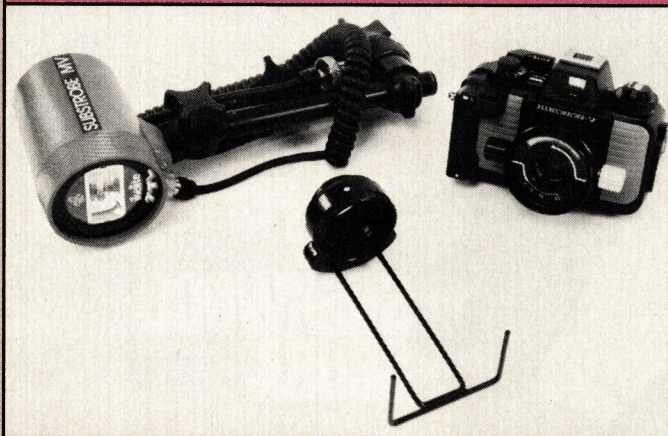
LESSON VIII: Macro Equipment

TEXT AND PHOTOGRAPHY BY GERI MURPHY



A Nikonos V camera with an SB-103 strobe and a 1:3 extension tube/framer makes an ideal macro setup for TTL or manual flash photography. With this setup, you can get crisp, colorful photographs of small reef creatures easily.

The basic equipment required for macro includes: a Nikonos V camera body, standard 35mm lens, mini strobe and an extension tube with framer. Several extension tubes/framers can be used, depending on the size of the subject.



One of the greatest attractions of macro photography is the minimum amount of accessories required. A beginning photographer can obtain stunning color photos in extremely sharp detail with an investment of a few extra dollars.

The following is a list of the basic equipment required for underwater macro photography:

- 1) A Nikonos camera body
- 2) A Nikonos 35mm (or 28mm) lens
- 3) A macro extension tube and framer
- 4) A mini strobe

While the Nikonos V is ideal for macro, any Nikonos camera body will do. The only difference between the V and earlier versions is its ability to use TTL (Through-The-Lens) automatic flash exposure.

The standard 35mm Nikonos lens is the most popular choice for macro photography as it requires no additional investment, yet produces exquisitely sharp photos. An alternative choice would be the Nikonos 28mm lens.

Extension tubes are made of machined metal and are available in a variety of different sizes. There are basically four different sizes for the 35mm lens and three for the 28. In some cases, two extension tubes are stacked to produce a third size.

A corresponding wire framer is attached to the extension tube. The framer indicates the precise focal distance as well as the picture frame area. The wire framers are painted black to avoid reflection or lens flare. Some manufacturers also produce a set of wire framers that allow the tubes to be used in air. They are painted blue so they cannot be confused with the underwater framers.

Mini strobes are available in a variety of different makes and models. There are basically two types; TTL and non-TTL. The features of both will be covered in later issues.

Assuming you already own the basic Nikonos camera and lens, the only extra accessories required are the extension tube/framer (\$50 to \$75) and a mini strobe (\$150 to \$350).

WHY AN EXTENSION TUBE?

An extension tube is required to overcome the physical limitations of the basic lens. Minimum focus for the 35mm Nikonos lens is 2.75 feet, for the 28mm Nikonos lens it is two feet. If you attempt to shoot closer, the picture will be out of focus (fuzzy).

When photographing any subject, it is usually desirable to fill the picture frame from corner to corner. If the subject is only a few inches in size, you need to bring the camera lens to within a few inches. As we have said, the basic camera lens will not focus at this close range. If you attempt to shoot the picture at a distance of 2.75 feet, the tiny creature will be lost in the coral reef appearing behind it. There will be no "viewer impact" to your photograph.

Inserting an extension tube between the camera body and the lens allows you to focus at extremely short distances, just a few inches from the front of the lens.

WHAT IS AN EXTENSION TUBE?

An extension tube is an aluminum tube that fits between the camera body and the lens. Its purpose is to extend the focal length of the lens.

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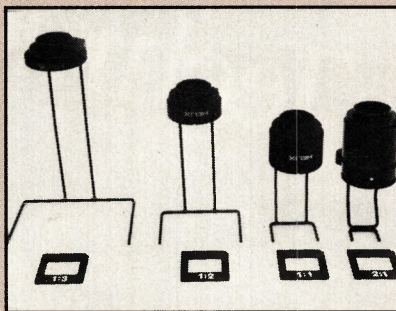
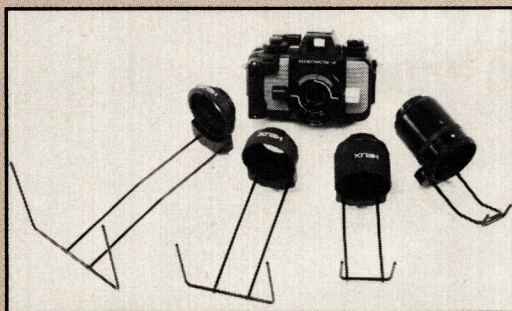
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There are four different sized extension tubes available for the 35mm Nikonos lens. There are additional tubes available for the 28mm lens.

The four extension tubes and framers in comparison to 35mm slide mounts. The center white portion of the mount is the actual picture size.

The focal length of a lens is the actual distance between the rear nodal point of the lens and the focal plane of the film. By increasing the focal length of a lens, you decrease the minimum distance limitation. For example, the 1:1 macro tube reduces the focal distance of the 35mm lens from 2.75 feet to 2.5 inches—almost a 93 percent reduction.

EXTENSION TUBE ASSEMBLY

There is a specific way to assemble an extension tube outfit. Extension tubes must be assembled in air prior to the dive and cannot be removed underwater. The extension tube has an O-ring similar to the one on the camera lens. This affects the watertight integrity of the camera system. The O-ring on the extension tube should be cleaned and lubricated with silicone grease in the same way as that of the camera lens.

The following is a step-by-step procedure for the assembly of an extension tube system:

Step 1) Remove the lens from the camera body.

Step 2) Attach the lens to the tube.

Step 3) Attach tube/lens to camera.

Step 4) Attach the framer to the tube. Be sure the framer is the right one for the tube selected. Most manufacturers use a color code system.

Step 5) Make sure the framer is properly seated and tightened securely.

Step 6) Be sure the lens is rotated so the bottom of the wire framer is parallel to the bottom of the camera body.

Step 7) Preset the aperture for f/22.

Step 8) Preset the distance for minimum focus.

EXTENSION TUBE REPRODUCTION RATIO

The term 1:3 is actually a mathematical ratio between the film image size (the first number before the colon) and the subject's actual physical size (the second number). For example, a one inch long shrimp would be 1/3 inch long on the film if photographed with a 1:3 extension tube. The same shrimp would be 1/2 inch long on the film if the photograph was taken with a 1:2 extension tube.

This mathematical ratio also indicates the degree of magnification of a specific size macro tube:

1:3—Picture image is 1/3 actual size.

1:2—Picture image is 1/2 actual size.

1:1—Picture image is actual size.

2:1—Picture image is twice actual size.

(Continued on Page 33)

MANUFACTURERS & DISTRIBUTORS OF EXTENSION TUBES FOR THE NIKONOS CAMERA

The following is a basic guide to what each manufacturer offers:

Aquacraft II
7992 Miramar Rd.
San Diego, CA 92126
(619) 271-7000

1:3/35mm
1:2/35mm
1:1/35mm
1:2.75/28mm

Helix
310 Racine Avenue
Chicago, IL 60607
(800) 334-3549

1:3/35mm
1:2/35mm
1:1/35mm
2:1/35mm
1:2.75/28mm
1:1.8/28mm
1:1/28mm

Ikelite U/W Systems
P.O. Box 88100
Indianapolis, IN 46208
(317) 923-4523

1:3/35mm
1:2/35mm
1:1/35mm

Nikon
623 Stewart Street
Garden City, NY 11530
(516) 222-0200

1:2/35mm
1:1/35mm
2:1/35mm

Oceanic
14275 Catalina Street
San Leandro, CA 94577
(415) 352-5001

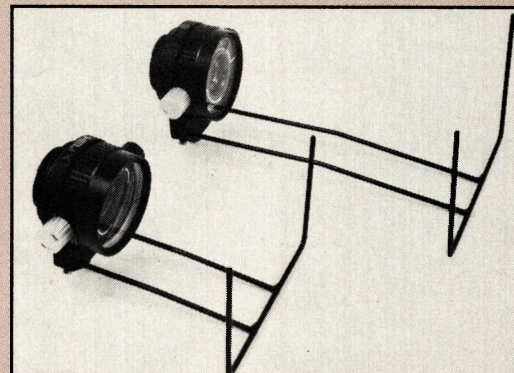
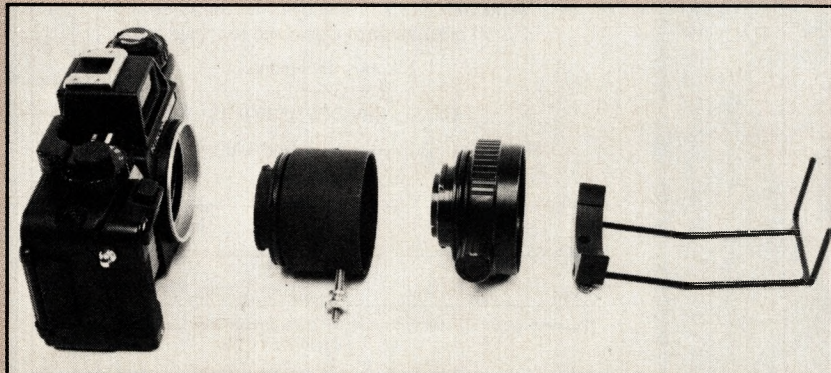
1:2/35mm
1:1/35mm
2:1/35mm
1:2/28mm

Sea & Sea USA
1030 W. 15th Street
Riviera Beach, FL 33404
(305) 844-8937

1:3/35mm
1:2/35mm
1:1/35mm
1:2/28mm

An extension tube is a mechanical device consisting of an aluminum tube that fits between the camera body and primary lens. By extending the distance between the rear of the lens and the film, the minimum distance for sharp focus is reduced. This allows you to fill the framer with the small subject.

A comparison of the 1:3 extension tube/framer for the 35mm (top) and the 28mm lenses. The 28mm lens has a shorter framer, allowing the lens to be positioned very close to the subject.



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COVER STORY/PHOTO ESSAY

STINGRAY CITY

WORLD'S BEST
12 FOOT DIVE



Stingray City offers visitors an opportunity to observe the bizarre behavior of a family of 7-14 southern stingrays. In less than 12 feet of water, this site is accessible to both snorkelers and scuba divers. Top: Hovering at eye level, a large ray gently takes a tid-bit from Ron Kipp. Above: Ron photographs Kathie Kipp during a ray feeding session.

Bob Hollis surfaced and broke into a wide grin. "This is the world's best 12 foot dive!" he exclaimed. This was no small compliment, coming from a diver who spent two high voltage weeks on the wreck of the *Andrea Doria*, traveled to the most exotic dive areas of the world and founded Oceanic U.S.A.

Hollis had just experienced his first encounter with the local residents of Stingray City—

Grand Cayman's newest and most exhilarating undersea phenomenon. He had been introduced to a family of the world's friendliest stingrays.

I was first introduced to this remarkable site by Ron and Kathie Kipp, owners of Bob Soto's Diving Limited, and their most experienced dive boat skipper, Captain Pat Kenney. Departing from Governor's Harbour, we had cruised across the flat calm waters of

North Sound and pulled up just behind the barrier reef near Tarpon Alley. As I looked out across the barrier reef my mind's eye envisioned the spectacular coral drop-off and great canyons of the North Wall, yet we were anchoring in 12 feet of water.

I gazed down into sparkling turquoise water that lay beneath the *Paradise Diver* and observed a flat sand bottom, patches of eel grass and a few

TEXT AND PHOTOGRAPHY BY GERI MURPHY



COVER STORY/PHOTO ESSAY

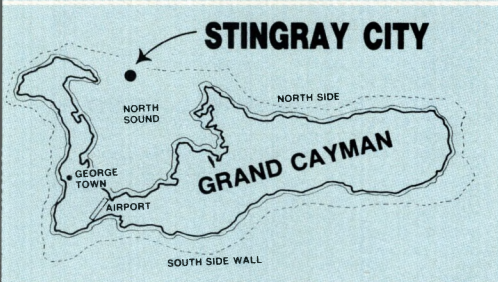


Ron and Kathie Kipp are enveloped in a swirling mass of stingrays as they first enter the water. These marvelous creatures greet arriving divers with the enthusiasm of puppies. Exhilarating encounters such as those shown have caused Stingray City to be dubbed, "The world's best 12 foot dive."



In search of food, the amazing rays parade across the sandy bottom, two abreast, swimming from one dive group to another. Ordinarily pictured as creatures that lie quietly on the bottom, half covered with sand, these rays exhibit far different behavior.

Below left: Stingray City is in the flat calm waters of North Sound, off Grand Cayman Island—just behind the barrier reef near Tarpon Alley. It has a sandy bottom with patches of eel grass. Below: Kathie Kipp strokes a southern stingray (note the remora attached to the bottom of the ray).



scattered solitary coral heads. Before he turned off the ignition key, Captain Pat gunned the engine twice. Suddenly, those coral heads began moving toward the stern platform of our vessel!

It did not take long to figure out those coral heads were actually stingrays attracted by the familiar sound of the boat engine. Armed with a bag of ballyhoo tid-bits, Ron and Kathie entered the water. They were greeted by seven southern stingrays who exhibited the excitement and friendliness of a litter of newborn puppies. They swirled around Ron and Kathie, happily flapping their wingtips as if visibly begging for food. Several of the rays nuzzled up to the divers' legs, gently pushing and prodding for a hand-out. Never in 20 years of diving had I observed wild stingrays behaving this way!

I had always been led to believe that the southern stingray was pretty much of a sedentary creature that spent most of its time lying quietly on the bottom, partially covered by sand. And, most of the rays I have encountered have acted this way. Yet, here was a group of the same creatures cavorting like circus clowns and appearing most un-ray like.

They were fascinating to watch and
(Continued on Page 149)



Diver's Calendar

U/W CASINO DAY

Water Education Training will host its first annual Underwater Casino Day for Muscular Dystrophy **September 5** at the La Jolla Jewish Community Center Pool in San Diego, California. For a donation to fight muscular dystrophy, contestants receive chips for underwater card games, craps and roulette. Prizes awarded at the end of the event include dive trips, training courses and T-shirts. Free introductory scuba classes will be held throughout the day.

For information contact Leslie or Mary at (619) 693-DIVE. ✖

SAN DIEGO FILM FESTIVAL

The San Diego Underwater Photographic Society will hold its 23rd annual Underwater Film Festival **September 11-12** at the San Diego Civic Theater. Different slide shows and films will be shown each night.

Tickets (\$10) are available at the theater box office (202 C Street, San Diego), most area dive shops and Ticketmaster. ✖

GUANAJA SEMINARS

Posada del Sol, Guanaja is offering two one week history seminars given by historian Mendel Peterson **September 12-19** and **September 19-26**. These will cover early exploration of the Bay Islands, pirates, life aboard treasure galleons and shipwreck diving.

For information call Posada del Sol at (800) 642-3483 or (305) 994-6232. ✖

INTERNATIONAL DIVE RESCUE '87 CONFERENCE

The International Association of Dive Rescue Specialists will host a dive rescue conference **September 20-23** at its headquarters in Fort Collins, Colorado. There will be distinguished speakers, discussion and hands-on field training. Dive teams, firefighters, law enforcement and medical personnel are eligible.

For information contact IADRS, 2619 Canton Court, Fort Collins, CO 80525; (800) 248-DIVE or (303) 482-0887. ✖

BEACH DIVE PHOTO COMPETITION

The Northern California Chapter of the Underwater Photographic Society will sponsor the seventh annual California Beach Dive Photo Competition in Monterey **September 26-27**. Divers receive film Saturday morning and must expose it in local waters by 2:00 pm. There will be a barbecue Saturday night and door prizes and awards Sunday afternoon.

For information contact Kathleen Rosenberg, 15750 Via Colusa, San Lorenzo, CA 94580. ✖

MADISON FILM FESTIVAL

Four Lakes Scuba of Madison, Wisconsin and Hoofers Scuba will host their second annual film festival **October 3** at the Sheraton Hotel in Madison.

For more information contact Four Lakes Scuba Club, P.O. Box 6112, Madison, WI 53716 or Jane Dwyer (608) 271-6255 or (608) 274-4443. ✖

DIVERS FLEA MARKET

The Southampton Submersibles will sponsor a Divers Flea Market **October 4** in the gymnasium of Long Island University's Southampton campus.

For information contact Valerie Philbrick, c/o Southampton Submersibles, Long Island University, Southampton, NY 11968; (516) 283-4000, ext. 140. ✖

VIRGINIA WATER RESCUE SAFETY COURSE

The Office of Emergency Medical Services, the Virginia Beach Underwater Recovery Dive Team and the London Bridge Volunteer Fire Department (all in the Virginia Beach area) will host a water rescue training course entitled Public Safety Scuba Instructors **October 5-10** in Virginia Beach, Virginia.

For information contact Sherman Morrison at (804) 491-1269 or the Office of Emergency Medical Services at (804) 428-6002. ✖

DIVE TO ADVENTURE '87

The Wet Set Dive Club of Beaumont, Texas will host its annual film festival and symposium, Dive to Adventure '87, at the Beaumont Plaza Holiday Inn **October 10**. The event finale is a film presentation by Jack McKenney.

For information contact Jim Brown, Wet Set Dive Club, c/o Davy Jones Locker, 3367 Plaza 10 Blvd., Beaumont, TX 77707; (409) 835-7010 or (409) 727-3681. ✖

SONOMA COUNTY DIVER RESCUE WORKSHOP

The 12th annual Sonoma County Diver Rescue Workshop will be held **October 10-11** at Santa Rosa Jr. College, Santa Rosa, California (Saturday) and Doran Beach Park, Sonoma County (Sunday).

For participant registration contact Janice Cockrell, P.O. Box 994, Fremont, CA 94537-0994. For staff registration contact Joan Bagniewski, P.O. Box 2792, San Rafael, CA 94912-2792. Enclose a self addressed stamped envelope (39¢ postage) with requests. ✖

DAN COURSE

The Divers Alert Network will host a course on managing diving accidents and hyperbaric oxygen treatment **October 17-24** on Peter Island, British Virgin Islands. The course is for physicians, emergency room personnel, paramedics and nurses and is approved for 24 CME credit hours and 2.4 CEUS for paramedics and nurses.

For information contact Cindi Easterling, P.O. Box 3108, Duke University Medical Center, Durham, NC 27710; (800) 222-9984 or 684-6485. ✖

U/W PUMPKIN CARVING

Water Education Training will hold its seventh annual Underwater Pumpkin Carving Contest **October 19** at Kellogg Park in San Diego, California. There will be a night diving lecture before the event and a bonfire and barbecue afterward. For information contact W.E.T. (619) 693-DIVE. ✖

skin diver

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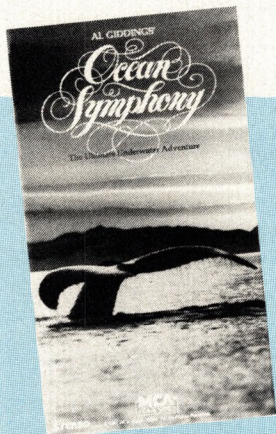
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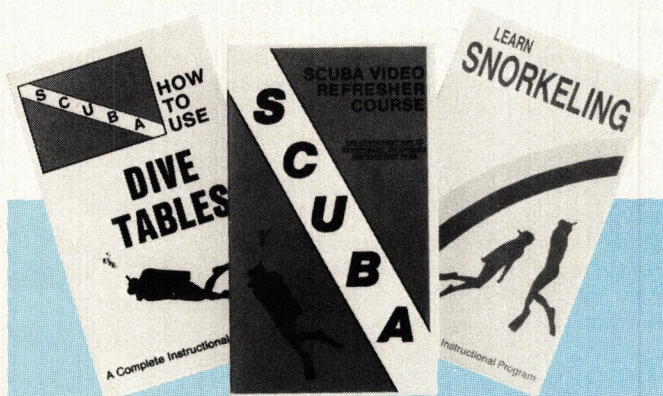
Ocean Symphony: This 47 minute video, filmed by Al Giddings, offers images of marine life set to an original score (HiFi stereo): whales, ice corridors, white sharks, octopus and more. It is available in VHS or Beta (\$29.95) from MCA Home Video (800) 972-5858, extension 224.



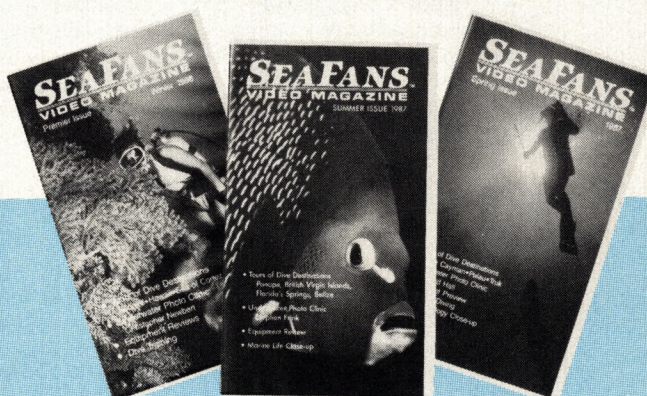
The Muro-Ami Dilemma: Appx. 20 min. Considered the most productive fishing method in the Philippines, *Muro-Ami* involves young swimmers using scare lines to herd reef fish into nets. This is both hard on the reef and dangerous for the boys. **Baja's Giants:** Appx. 20 min. Whale sharks, manta rays and schooling hammerheads are encountered in the Sea of Cortez. **Truk's Legendary Lagoon:** Appx. 20 min. Warships sunk in 1944 are time capsules and havens for marine life. SeaVisions videos are available (\$29.95 each plus delivery, VHS or Beta) from All Environment Productions, P.O. Box 3093, La Jolla, California 92037.



Nikonos Use Tape: This 60 minute video covers the Nikonos system: Nikonos V, SB-102 and 103 strobes, extension tubes, Close-Up Kit, 35, 28, 20 and 15 mm lenses. In VHS, Beta or 8mm (\$29.95) from Whale's Eye Photo, 6674 NW Highway, Chicago, Illinois 60631.



Learn Snorkeling: Appx. 30 min. \$29.95. VHS or Beta: basic snorkeling is covered as are advanced skin diving techniques and open water snorkeling. **Scuba Video Refresher Course:** Appx. 37 min. \$49.50. VHS or Beta: health and physical fitness are discussed; basic pool training is shown; diving hazards; advanced pool training; open water diving. **How to Use Dive Tables:** Appx. 36 min. \$49.50. VHS or Beta: guidelines for dive table use are given as are definitions of terms used; sample problems are included as is a repetitive dive planning guide. CME Video Productions, Bay Point Box 461, Panama City, FL 32407.



Sea Fans Magazine Winter Issue, 1986: sealions, hammerheads and manta rays in the Sea of Cortez; Chris Newbert on macro; Bonaire diving; Dacor's Seachute HTS BCD and Scubapro's G250 regulator; U/W habitat; Kauai. **Spring, 1987 Issue:** Little Cayman; Howard Hall on wide angle; the seafan; Palau; new gear; seaplane diving; Truk Lagoon. **Summer, 1987 Issue:** Florida springs; Ponape; dive lights; Belize; Stephen Frink on marine life photos; angelfish; British Virgin Is. These 90 minute videos (\$29.95 each, VHS or Beta) are available from Sea Fans Video Magazine, 7800 East Iliff, Suite E, Denver, CO 80231.

The Blue-Striped Snapper

(*Lutjanus kasmira*)

The blue-striped snapper, distinctive for its four bright blue stripes against a yellow background, is a very common Indo-Pacific reef fish often found in enormous schools. Divers have reported being nearly lost in swarms of hundreds of blue-striped snappers hovering over a reef area, and describe it as a spectacular experience. □ The blue and yellow markings of this snapper are reminiscent of a number of grunt (*Haemulidae*) species and some individuals have a reddish hue about the face (which also hints of the red mouths of grunts). The overall coloration of the blue-striped snapper varies from bright golden to lemon yellow and the blue stripes run lengthwise from head to tail. There is sometimes a dark spot underneath the anterior part of the dorsal fin. The fish grows to about 12 inches and, like most snappers, is considered an excellent food fish. □ Snappers belong to the family Lutjanidae and have earned their common name because they snap. Fishermen handling them on a line know to handle them with care. The snappers comprise a large family, with approximately 250 species found around the world. Many of them are highly prized in the commercial fishing industry, although some are known to cause ciguatera (fish poisoning). □ The blue-striped snapper ranges throughout the Indo-Pacific, including the Philippines, China, Japan, Polynesia (except Hawaii), Micronesia, Melanesia, off Australia and in the Indian Ocean. In Australia the fish is often called

"blue-banded sea-perch" (although it is not a perch) or "blue-banded hussar." Natives also refer to it as the "moonlighter," which comes from the fact that the species is frequently line-fished at night. □ Hawaii has no native species of *Lutjanus*, but two have been introduced from French Polynesia. In the Spanish speaking Gulf of California and among Caribbean natives, snappers are called pargos. *Lutjanus* comes from "*lutianus*," a derivative of the Malayan name for fishes. □ Most snappers can be distinguished by their profiles.

They have long, pointed faces, often referred to as the "snapper look." Many of them have yellowish fins. Within the snapper family, some species are separated by complicated technical determinations, such as tooth patterns, but quite often the color patterns alone

are adequate for identification. □ Most snappers are shallow water inshore fishes and some live in deep water and midwater areas, cruising well above the reefs. The blue-striped snapper is an inshore reef fish that hovers near ledges and reef formations by day and spreads out to feed at night. The juvenile snappers of some species enter mangroves and estuaries where fresh and saltwater mix and in these nursery grounds grow up with a variety of other marine fishes. □ Snappers have enlarged canine teeth and are carnivorous. They feed on fishes and crustaceans such as shrimp and crabs, and individuals kept in aquariums must be fed a similar diet. »

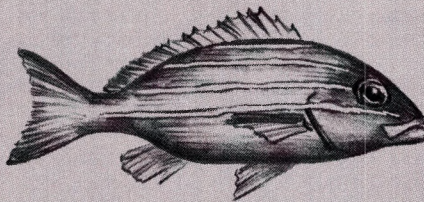


Photo By Carl Roessler - Text By Hillary Hauser

Carl Roessler took the photograph 50 feet U/W on Great Astrolabe Reef in Fiji. He used a Nikon F camera with a 55 macro lens in a Niko-Mar housing and a Bauer E252 strobe. Kodachrome 64 shot at f/11, 1/60 second.





Diving Medicine

BY ALFRED A. BOVE, M.D., PH.D.

"For the same reason drinking and driving don't mix, neither do drinking and diving."

My diving friends often joke about the macho divers who, in some distant era, established the image as hardcore drinkers and carousers. In my travels, I don't find this to be the case, although there are sometimes historical vignettes by those who wish to remain in the past.

In the general population, the alcohol and tobacco habits of the past now extend to drugs—especially cocaine—and while use of these agents goes on, in medicine we see more and more data showing their dangers, especially to the heart. For the next few months I will discuss these "pleasures" and their effects on health and living.

ALCOHOL AND THE HEART

For many years, alcohol was considered to be a relaxant that protected the heart from atherosclerosis. At the same time, direct damage to heart muscles from alcohol use was well documented.

We have known for many years that alcoholics often develop irreversible damage to the heart muscle. The damage weakens the heart, causing it to pump inadequately, and ultimately results in permanent disability. Besides the effect on heart muscles, alcohol constricts blood vessels. Thus, some people with coronary artery narrowing from atherosclerosis have developed chest pain after drinking alcohol. This indicates alcohol constricts already diseased arteries, resulting in inadequate flow of blood to the heart and, therefore, oxygen starvation.

Heart muscle damage usually develops after several years of excessive drinking. Artery narrowing, on the other hand, is an immediate response that occurs *each time alcohol is ingested*. The amount of alcohol needed to cause permanent heart damage is unknown. Some people seem to develop heart injury after only one to two years of drinking, while others drink heavily for many years without damage. Mild inebriation will result in artery narrowing and people with coronary disease may develop signs of oxygen deprivation of the heart.

ALCOHOL AND HIGH BLOOD PRESSURE

Recently, we have come to understand

that alcohol can produce chronic problems with hypertension. This again is owing to the constrictor effect of alcohol on smaller blood vessels in the circulation. We have come to think of alcohol as a relaxant, a dilator of blood vessels, but this effect is mainly in the skin, where redness or flushing may follow alcohol ingestion. The blood vessels in the muscles—the greatest mass of tissues in the body—constrict from alcohol, causing a rise in blood pressure. In my own practice I find hypertension is difficult to control when a patient continues to drink heavily and it



often disappears when the drinking stops. A study found an increase in the incidence of strokes among men who drink heavily and heavy drinkers have an increased incidence of sudden death.

In the past, beer was served to runners in long distance races and drinking it before a race was encouraged. With all of the medical knowledge on the adverse effects of alcohol on muscles, it is amazing this fad ever developed.

BENEFIT OF ALCOHOL?

In spite of the many well documented detrimental effects of alcohol, some physicians and scientists feel it has some benefits. It is a relaxant of the mind. This effect comes about from alcohol reducing the function of brain cells. The resulting state of mild anesthesia dulls the senses and causes a "relaxed" feeling. In large

doses, alcohol can be used as an anesthetic. Alcohol also modifies blood fats. The shift caused by alcohol in the blood fat—called HDL cholesterol—is in a favorable direction—that is, it is thought to reduce the chance of coronary disease. This effect is still under study, and if found to be true, would indicate benefit from a small amount—equivalent to three to four ounces of whiskey a week.

Many people use alcohol to relieve tension generated by daily stress. To obtain the effect, one must dull the senses a bit. Any task requiring careful thought, reasoning, quick thinking or fast reflexes should not be attempted after drinking alcohol. Like nitrogen narcosis, the inadequate performance induced by alcohol is not always perceived.

DIVING AND ALCOHOL

Persons who show the ravages of chronic heavy alcohol ingestion over many years should not dive. These individuals usually have permanent, severe liver injury, heart damage, permanent brain injury, damage to nerves, malnutrition, bone damage and anemia. If you have not ingested alcohol heavily and are in generally good health, it is the acute effects of it that must be considered. Remember: Alcohol dulls the senses. It can combine with nitrogen narcosis to cause a severe state of temporary mental incompetence. Physical tasks cannot be performed correctly on the surface or underwater and judgement is impaired so risky or dangerous situations will not be perceived. Drunk swimmers are at risk for drowning. Drunk divers are no better off. Alcohol impairs your exercise capacity. You cannot swim as fast, as far or as comfortably. If you need physical strength and endurance to avoid a risky situation, the energy may not be there. For the same reason drinking and driving don't mix, neither do drinking and diving.

So, what is the right approach to alcohol? A glass of good wine with a good meal and watching a Caribbean sunset over a piña colada are a couple of life's pleasures that shouldn't be denied. But, dulling the senses with too much alcohol is the wrong approach, especially when you are diving.

NIKONOS COURSE

(Continued from Page 22)

There are four common macro tubes for the 35mm lens: 1:3, 1:2, 1:1 and 2:1. Each size differs in tube length, wire framer length and wire framer area.

The 1:3 is the shortest tube with the longest and largest wire framer. It has the least amount of magnification. Next in line for increased magnification is the 1:2 and then the 1:1. The 2:1 macro tube has the longest tube and the shortest, smallest wire framer area. It also produces the largest magnification.

There are three common tube sizes for the 28mm lens. They are 1:1, 1:2 and 1:3. Some manufacturers produce slightly off-size ratios such as: 1:2.75 instead of 1:3. These extension tubes differ only slightly in size and thus, are not regarded as a different category.

It is important to match the extension tube and framer to the subject. An oversized framer will diminish the impact of the picture, while an undersized framer will allow you to photograph only part of your subject. Since you cannot switch tubes and framers underwater, you must select subjects that will fit the size of framer you have chosen for the dive.

The following is a basic guide for the average sized creatures found on most coral reefs.

REEF CRITTER GUIDE

1:3 macro—	brittlestar arrowcrab bristleworm crinoid sea urchin anemone hermit crab octopus fish portraits file shell
1:2 macro—	featherduster worm small sea urchin banded coral shrimp Christmas tree worm nudibranchs small seahorse
1:1 macro—	anemone arm brain coral pattern small Christmas tree worm wrasse blenny flamingo tongue <i>Tubastrea</i> coral blue cleaner shrimp
2:1 macro—	eyeball of lobster fire coral tentacles coral polyps bristleworm face

(Continued on Page 36)

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DACOR WARM-UP SUIT

A FAST PUT-ON

BY JIM WALKER

photos/Bonnie J. Cardone


Whether you dive at the beach or from a charter boat, warm, comfortable clothing that allows easy movement will make your diving day much more pleasurable. A lightweight outfit you can nap in or stuff in a gear bag, without its holding wrinkles long, would be nice, and stylish garments with just a hint of "diver" wouldn't hurt. Even better is an outfit you can put on or take off quickly. Dacor's Warm-Up Suit offers all these features.

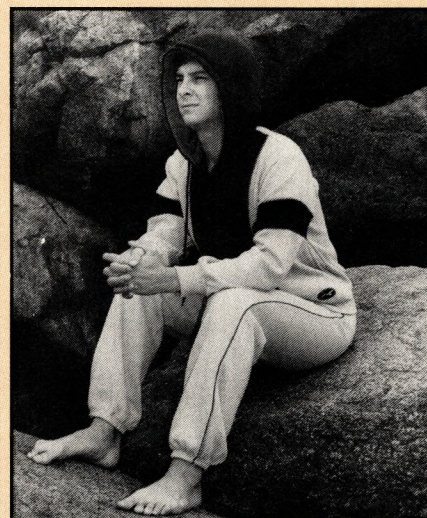
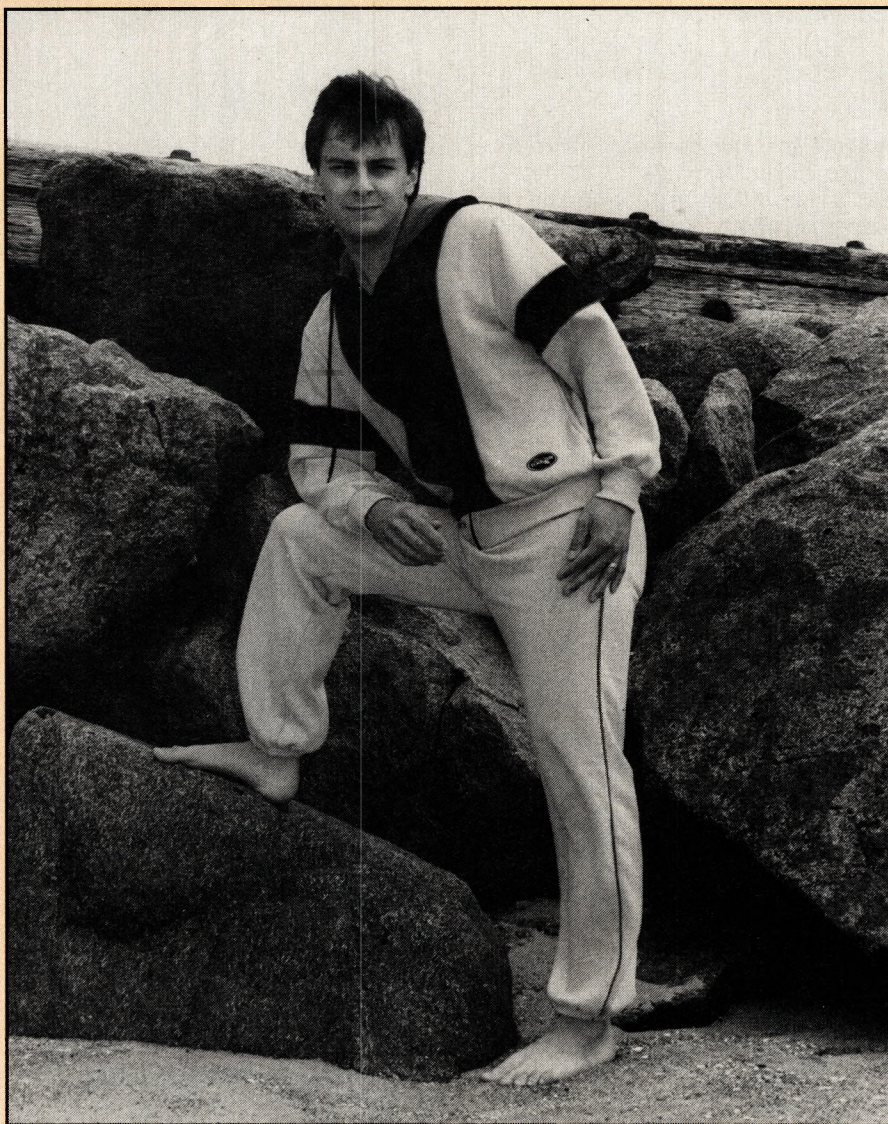
Made of soft, textured 65 percent polyester/35 percent cotton, the Warm-Up Suit is so light and airy you'll hardly know you're wearing it. Yet it provides enough warmth to take the chill off a foggy morning or a breezy after-dive boat deck. For maximum warmth, you can wear the full suit and pull the hood over your wet hair. If you want to tan your legs but keep your torso warm, wear the jacket alone. If you want to cover your knobby knees but tan your back, wear just the pants. If you want something in between, wear both but unzip the jacket. As the weather changes, so can your outfit—in seconds.

The pants are gray with red piping. The cut is generous to facilitate movement, yet slim enough for style. The cuffs have sewn-in elastic so the pant legs won't ride up during exercise. The waist has a wide band of sewn-in elastic that will keep it snugly comfortable on a variety of waist sizes before and after lunch. Additionally, there is a drawstring in the waist-

band to secure it during vigorous exercise or if your hips have disappeared. The left hip has a pocket closed with a non-corrodible plastic zipper.

The jacket is gray with a black hood (red inside), black V-front panel and black arm bands. Red piping accents the design. The cut is very generous so you can wear most anything you want under it. The jacket closes with a black plastic zipper and the hood has a drawstring to keep it in place in the wind. The sleeves have stretchy cuffs for a comfortable fit, and the waist of the jacket has a similar band to seal against the hips. There are large slash pockets as well.

The Warm-Up Suit is available in extra small, small, medium, large and extra large. One style accommodates men or women. It is machine washable (warm) and machine dryable (warm, tumble cycle). Try one on at your nearest Dacor dealer, it's only \$49.95 and perfect before and after your dive. You can even exercise in it! 



Mauricio Parra models the Dacor Warm-Up Suit. Lightweight, sturdy and comfortable, the suit is perfect for wear before or after a dive. It is adaptable to a variety of weather conditions.

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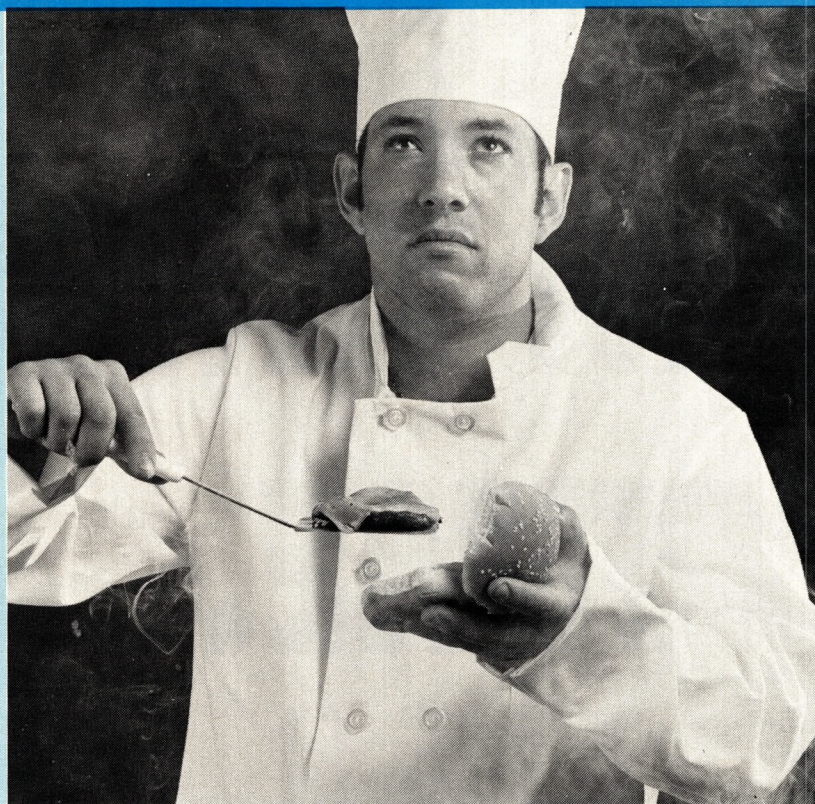
C. ROESSLER



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NIKONOS COURSE

(Continued from Page 33)

It is best to start your macro photography with the 1:3 macro tube and framer. This setup provides the greatest depth-of-field and offers the widest selection of creatures. Once you have become skillful with it you can progress to the more challenging levels of 1:2 and then 1:1 macro.

It should be noted that 2:1 macro is extremely difficult and very limited in subject selection.

DEPTH OF FIELD FOR MACRO


Tube Size	Depth of Field
1:3	1 1/4 inches
1:2	3/4 inch
1:1	1/4 inch
2:1	1/8 inch

There are at least six companies manufacturing or importing extension tubes and wire framers for U/W photography. While these tubes may appear to be basically the same size, there are a number of significant differences.

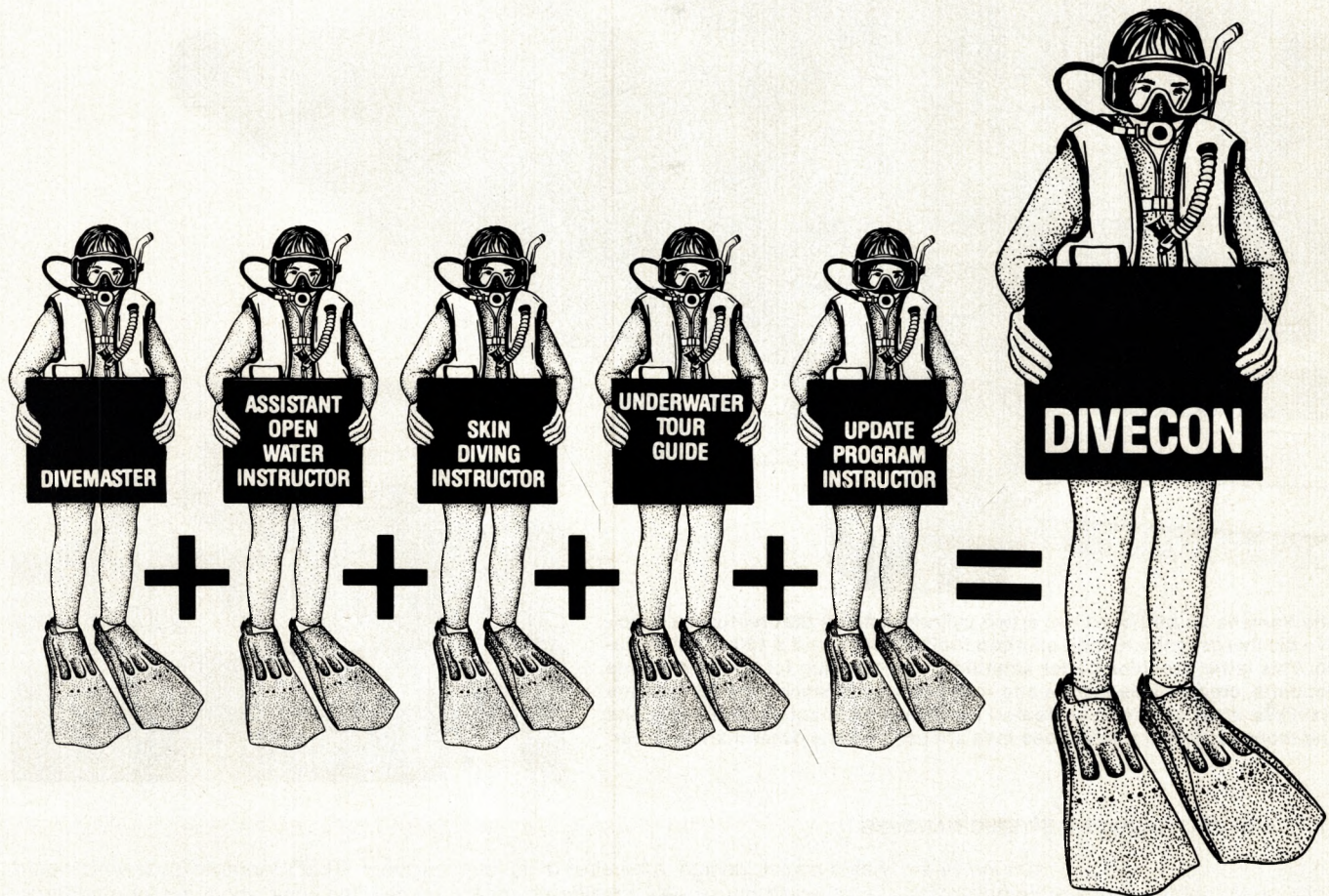
Lens compatibility is a basic consideration, as different companies offer various combinations of tubes and framers that fit either the 35 or 28mm Nikonos lenses. Some companies seem to offer a wider selection for the 35mm lens, so don't be discouraged if at first you can't find tubes and framers for your 28.

One of the most noticeable differences between companies is the design of their framers and the method in which they are attached to the extension tubes. The most common framer is the wire "coat hanger" style, which is attached to the tube by means of a small knurled brass nut. However, Oceanic framers are held in place by stainless steel machine screws and Sea & Sea features a completely different framer with a flat metal support plate and removable upright wires.

Several companies offer combination sets containing several basic sized tubes and a wide range of framers. With such combos, two tubes can be stacked to produce a third tube size with a corresponding framer. For example, Helix offers a combo kit of three tubes and seven framers that covers the entire range of underwater macro sizes for the 35 and 28mm lenses. Aquacraft II and Oceanic also offer combo sets.

You may wish to start with just one tube or you may want to obtain catalogues from all of these companies before making your final decision. Whatever you decide, you will find macro to be one of the most rewarding fields of underwater photography. 

It takes a lot to make a Divecon



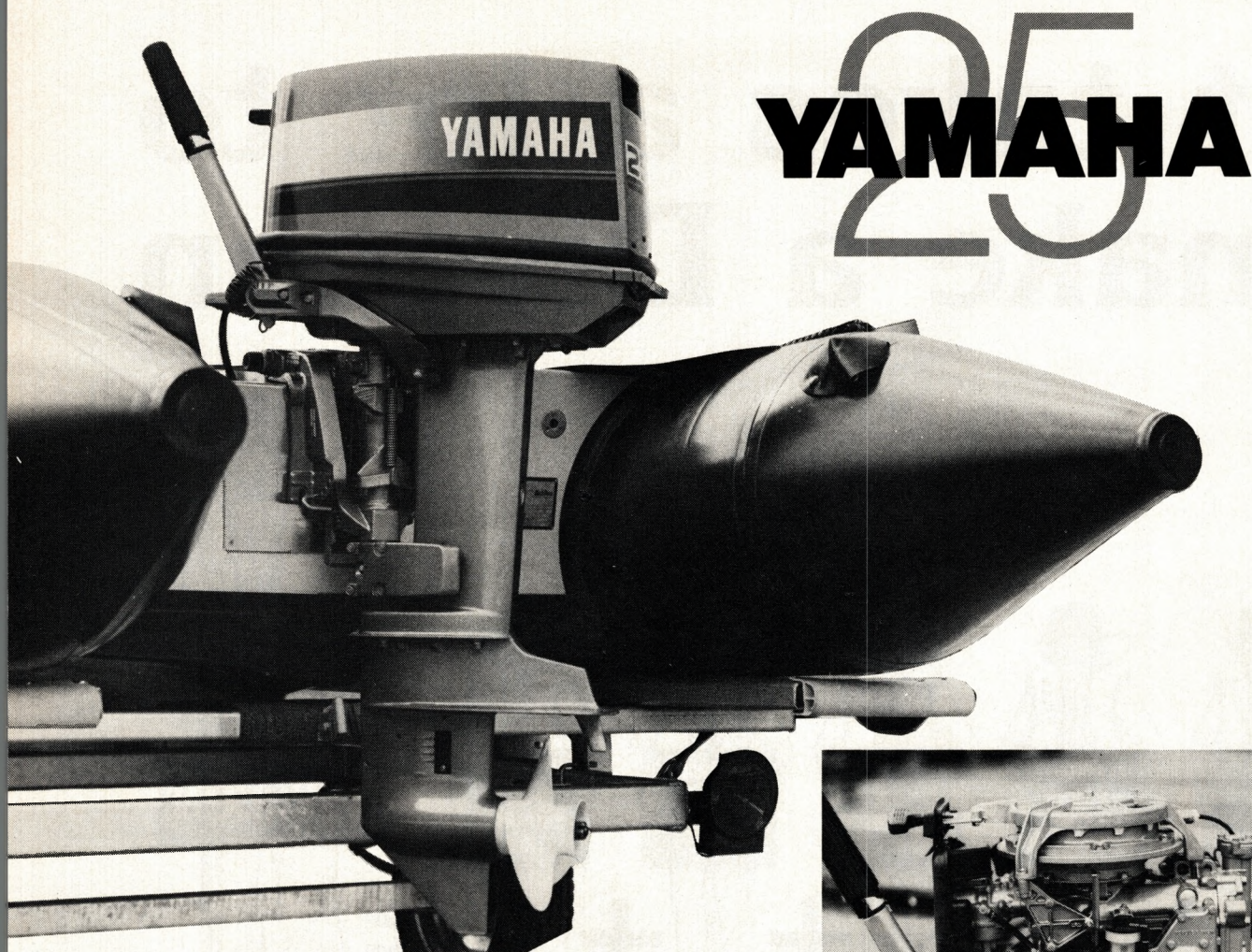
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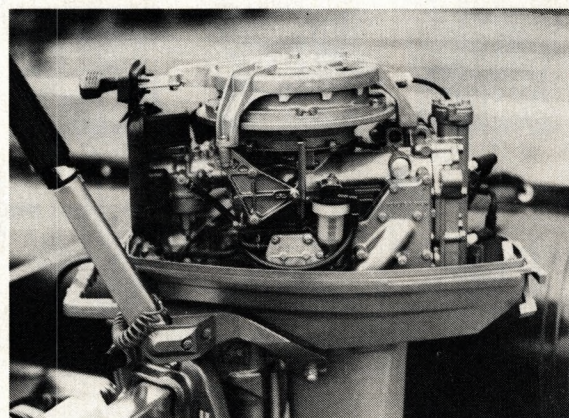


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The Yamaha 25 outboard has a two cylinder engine that features capacitive discharge ignition, loop charged fuel induction and a 100:1 fuel/oil ratio. This latter provides better economy, reduces plug fouling and engine deposits, creates less smoke and reduces maintenance. The 25 features stainless steel or specially treated corrosion resistant screws and bolts and more sacrificial zinc anodes than are used by any other manufacturer.



TEXT AND PHOTOGRAPHY BY ERIC HANAUER

In his 1941 book, *The Log from the Sea of Cortez*, John Steinbeck complained continuously about a cantankerous outboard motor. Playing it for laughs, he gave the machine malignant anthropomorphic qualities as it continually frustrated him and his pal, biologist Ed Ricketts. In calm, flat waters it ran like a champ. But whenever it was really needed, the engine would sputter and die, forcing the crew to row the skiff long distances against heavy swells.

In a way, it's too bad Steinbeck and Ricketts didn't live long enough to use today's generation of outboard motors. They would have gotten more accomplished on their scientific collecting trip. On the other hand, perhaps efficiency's loss was literature's gain. A calm, reliable outboard could have resulted in some pretty dull reading.

The Yamaha 25 is a case in point. Although it represents the mainstream of to-

day's engine design, a number of its features would have been considered miracles in Steinbeck's day. These include capacitive discharge ignition, loop charged fuel induction and a 100:1 fuel/oil ratio. Even measured against its contemporaries, Yamaha's 25 horsepower engine is widely respected in its class.

This is Yamaha's largest and most powerful two cylinder engine. All its motors in the two stroke family of twins, from the 6 to the 25, run on a lean 100:1 fuel/oil mixture. In the past, two stroke engines using pre-mixed fuel ran on 50:1. The leaner mixture provides better economy, less plug fouling and engine deposits, less smoke and less maintenance. It was made possible by reducing friction within the motor and introduced by Yamaha four years ago. Since then, most manufacturers of outboard motors have followed suit.

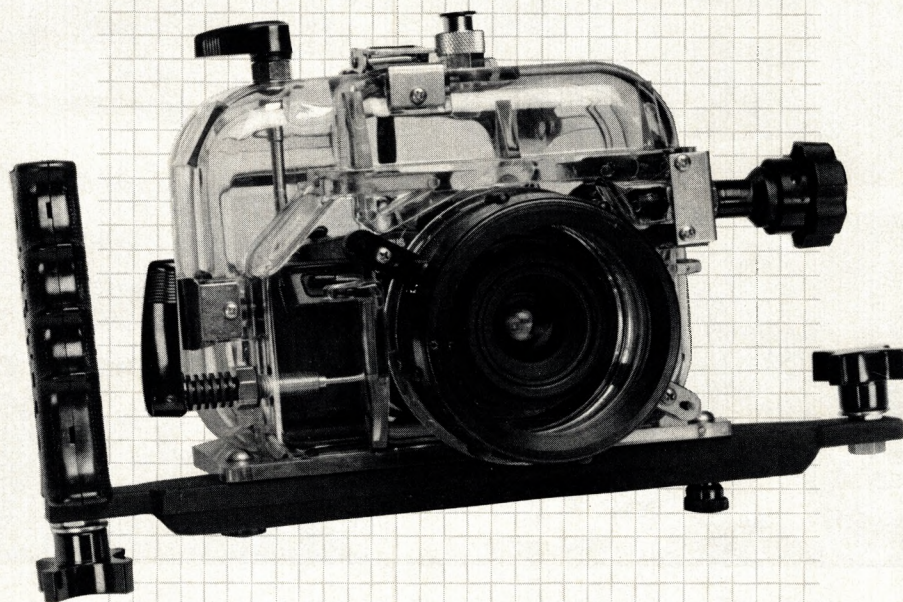
Fuel induction is by the loop charging

system. That's another buzzword heard quite often when shopping for outboards. Loop charging is simply a system that swirls the fuel charge through the cylinder, making use of unburned gasoline. Used in engines up to 225 horsepower, it results in better economy and power when running at high rpms. Like all Yamahas, the 25 runs either on leaded or unleaded gasoline without any modification or loss of performance.

Owning an outboard motor is a constant battle against corrosion, especially if it is used in saltwater. About the only things in saltwater that won't corrode are fish. Most corrosion is caused by electrolysis. When two dissimilar metals are placed in saltwater, an electrical charge is set up that attacks and destroys the softer of the two. To combat electrolysis, manufacturers place small pieces of zinc, called sacrificial anodes, in strategic lo-

(Continued on Page 146)

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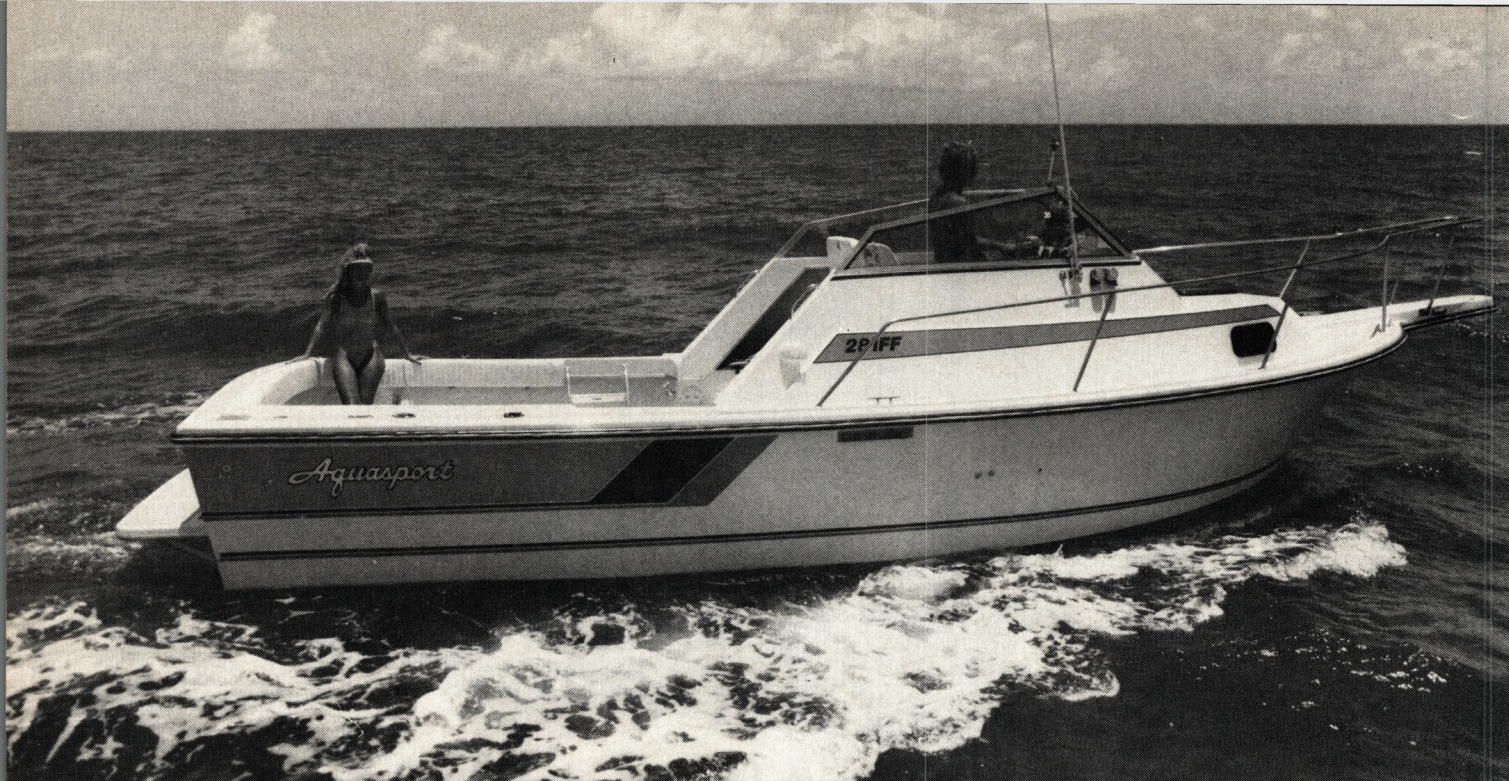
NIKON 2000 [non auto focus]	#6720 TTL
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AQUASPORT 281 FF

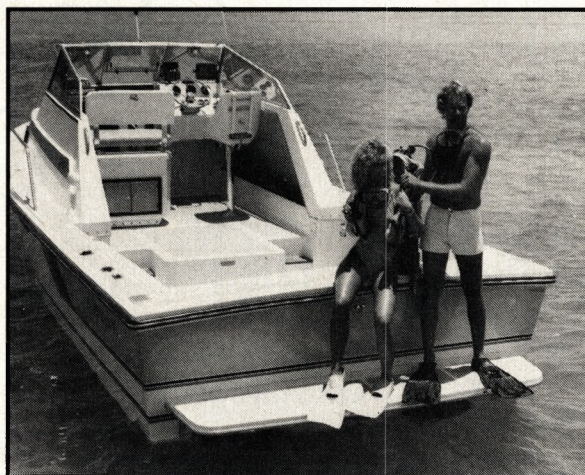
TEXT AND PHOTOGRAPHY BY GREG JOHNSTON

I guess you could say I'm a dreamer. I spend most of my day in an eight by ten foot office with no windows and little motivation. The only salvation I have is my vivid imagination, which usually takes me off to some high seas adventure. To make matters worse, each year south Florida is host to one-half dozen or so boat and marine shows. Like most people in the attending crowds, I walk around in a daze of nautical bewilderment dreaming of some day owning one of these magnificent water machines.

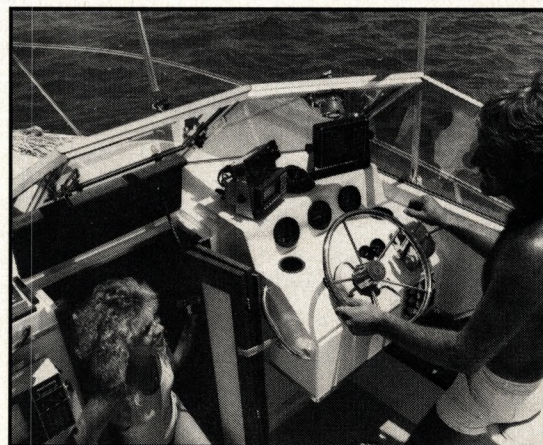
As a diver, marine photographer, weekend fisherman and general water-sports lover, I am quite particular on the design, style and durability of my dream boat. I would still probably be just a dreamer if it weren't for the folks at Aquasport. They invited me out for a day of sun and fun on their newest model, the 281 Family Fisherman.

This was something new for me. To test a dive boat and be subjective, without being overenthusiastic. When I first arrived at Keystone Marina in North Miami, Florida, I boarded the gleaming gray and white boat trimmed in stainless steel with some hesitation. My immediate thoughts of financing this mini-yacht, brought horrid visions of re-mortgaging the house, selling the dog and giving up Saturday evening outings. However, with two models to choose from—the 281 Family Fisherman or the 218 Charter—a

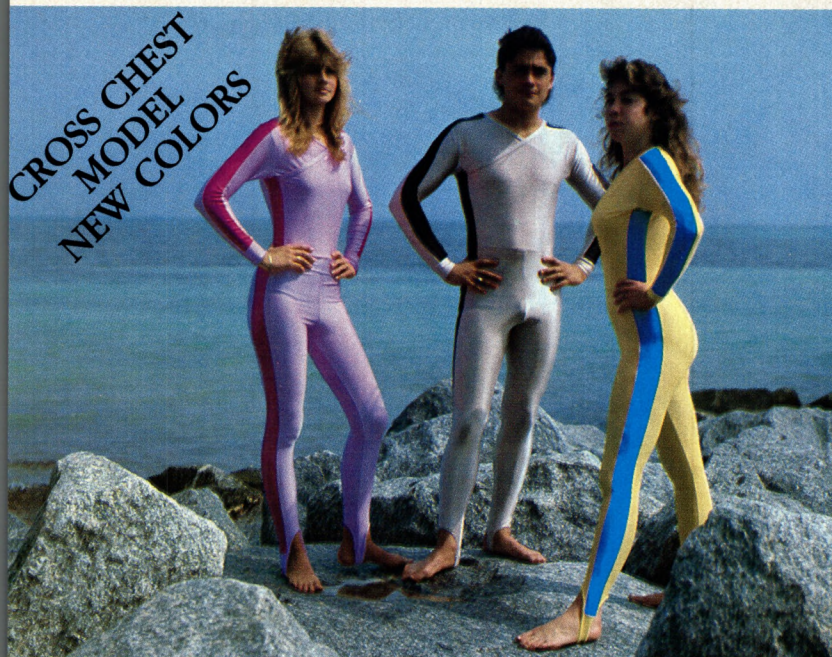
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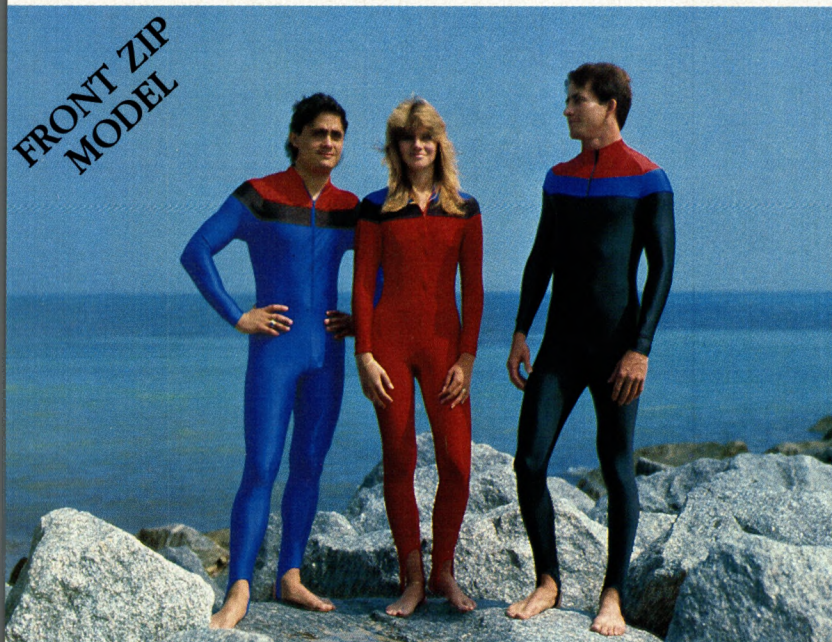
Twenty-eight feet, ten inches long, the Aquasport 281 Family Fisherman features a spacious twin berth cuddy cabin and twin swivel pedestal seats. An optional bench seat (shown here) can be added. There is a wide dive platform, lots of open deck space, and 30 gallons of fresh water for weekend cruises or rinsing gear. Features include: Loran, VHF radio, fishfinder, autopilot, navigational lights and instrumentation, bilge pump, bilge blower, electric horn, power trim and tilt, tachometer, compass, temperature gauge, voltmeter, fuel gauge and drink holders.



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**TEXT AND PHOTOGRAPHY
BY JACK BISSELL**

Mention freshwater photography to the inland diver and you'll probably get a response such as, "Take photographs in a lake, why?" It's true, lakes, rivers and creeks don't offer clear water or colorful critters. But, what's the land-locked underwater photographer supposed to do—be happy to take his Nikons out of the case only for that yearly Caribbean trip? Actually, the inland diver has unlimited photo opportunities—with a little effort he/she can hone photographic skills and also get some amazing shots. Using the right equipment and techniques can result in quality freshwater photos even when the visibility is less than ten feet, which is typical of most lake diving.

Freshwater photo equipment is the same as that used for ocean picture taking: A Nikonos camera or housed camera and strobe, a macro lens or extension tube and a wide angle lens. Willing subjects, whether they are diving buddies or freshwater creatures, are also needed. If you are interested in taking pictures of divers, you will find that a silicone mask is a good idea since it allows light to illuminate your model's face.

One of the main problems with freshwater photographs is backscatter. This occurs when tiny particles in the water reflect strobe light back to the camera, making the subject look as though it's in a snowstorm. Backscatter is not just a freshwater phenomenon, but because there are usually a lot more suspended particles in fresh water than in saltwater, it's a lot more noticeable. Backscatter can be overcome by using two techniques. First, minimize the number of suspended particles between your camera and subject by shortening the distance between the two. This means using a wide angle lens and moving in close. A general rule of thumb for photography, in any type of water, is to position yourself no more than one-tenth the limit of visibility from your subject. For example, if the visibility is 25 feet, your camera should be a maximum of two to three feet from your subject.

The second technique to reduce backscatter is to use extreme side lighting, aiming the strobe at the side of the subject rather than the front. This results in light on the subject, but the particles suspended in the water reflect light away from the camera instead of toward it.

Macro is perhaps the easiest way to get started in freshwater photography. Shallow streams offer the possibility of shooting small fish and invertebrates while snorkeling. Some of the common inhabitants of freshwater streams are darters, shiners, bream, frogs, crayfish and turtles. Male rainbow darters are particularly colorful during the spawning season, April through June. Darters spend a



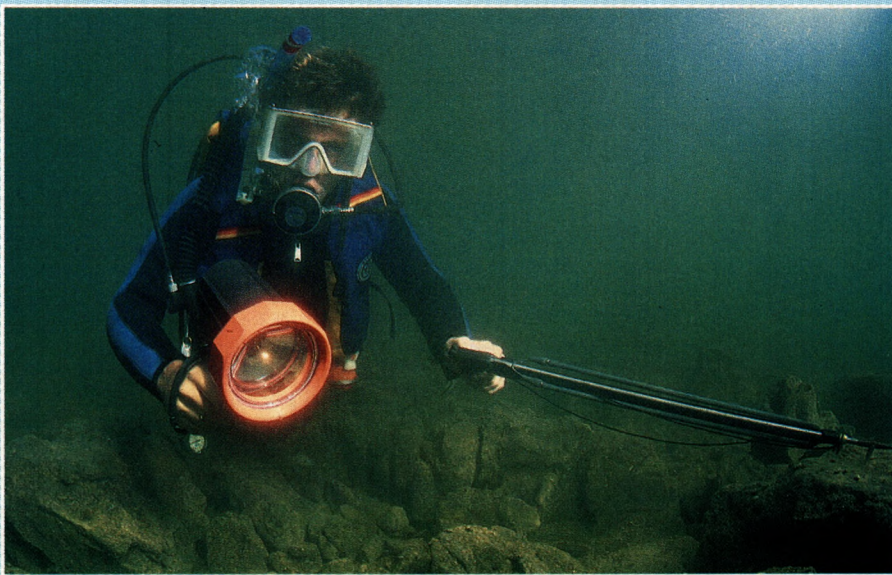
Opposite page: A hooked largemouth bass. Above: Diver with crayfish—Ektachrome 64, f/16, 1/60 second, Subsea Mk 150 on low power; a shiner—Nikon F in a Hydro 35 housing, Nikkor 55mm lens, f/22, 1/60, Ektachrome 64, strobe on high; a diver at the Arches in Lake Norfolk—Nikkor 16mm lens, f/8, 1/60, Kodachrome 64, strobe fill.

lot of time just resting on the bottom and are easily approached. Many animals are more easily approached at night and these fish are no exception. A modeling light used on the strobe seems to mesmerize them. A 1:3 extension tube on a Nikonos works well for the two to three inch long fish. The bottom bar of the frame can be pushed slowly into the sand or gravel in front of the fish. This gives a good side or three-quarters front view of the subject, which is much more pleasing than a downward angle shot. Darters prey on juvenile crayfish and, as they get older, these crustaceans also make excellent macro subjects.

Shiners are also abundant in many

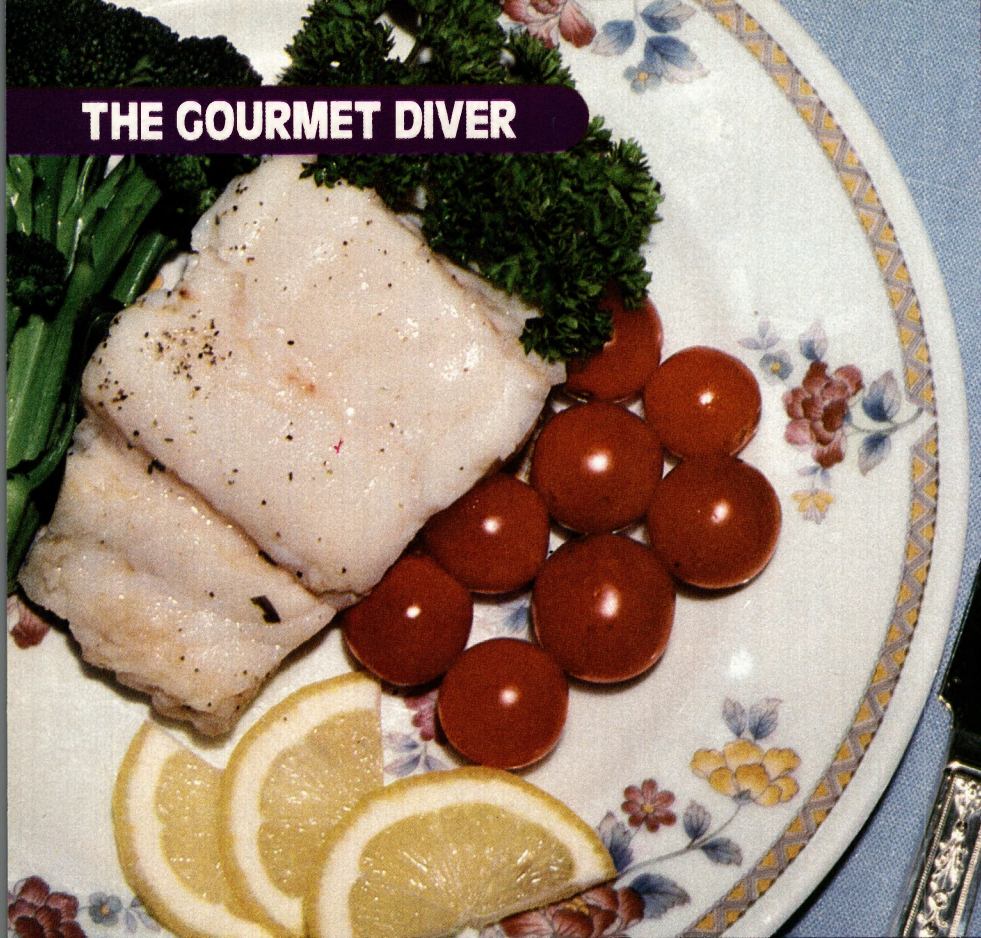
creeks. Unlike the more solitary darters, the shiners will be found in schools. For them, a housed single lens reflex camera with a macro lens is a good choice. You need as much depth of field as you can get, so shooting at f/22 or f/32 is necessary. The shutter speed is fixed with strobe photography, leaving strobe power as the only variable. Bracket your exposures by varying the strobe power or by varying the strobe to subject distance. Once you determine the proper exposure, you are on your way to getting some good freshwater photos. Remember, even though we're photographing subjects only inches from the lens,

(Continued on Page 145)



A diver with light and speargun—Nikon F camera in a Hydro 35 housing, 16mm Nikkor full-frame fisheye lens, Ektachrome 100, f/8, 1/60 second, flash fill from a Subsea Mk 150 strobe on low power. Color in the diver's gear adds interest.

THE GOURMET DIVER



LINGCOD

Many divers have been and will continue to be attracted to the sport by the lure of the great feast the oceans have to offer. Lobsters, abalone, scallops and many species of fish are all on the menu for those who know their secrets and possess the appropriate skills and equipment. It is said that the way to a man's heart is through his stomach. This must be particularly true of divers.

California spearfishermen are some of the most active in the world and more often than not their quarry is the lingcod (*Ophiodon elongatus*). Gourmet and other knowledgeable divers seek these fish both because of their large size and the fine texture and flavor of their filets. These are the largest members of the Hexagrammidae family (the greenlings) and should not be confused with the unrelated Atlantic cod (*Gadus morhua*). These fish are natives of the West Coast of North America from Alaska to Baja California. Some 10 million pounds of lingcod (or lings as they are commonly called) are harvested annually and about six percent of that is taken by spearfishermen. Lingcod are the second most frequently speared fish in California (combined

rockfish of the genus *Sebastes* are number one), yet, more pounds of lingcod are taken than any other genus. Divers have become successful at taking large fish, knowledge of the fish's behavior and history has contributed to this success.

Lings can be found in all bottom habitats from the intertidal zone to deeper than 1,000 feet, but are most commonly found on rocky reefs 60 to 200 feet deep. Tagging and release experiments have shown that lingcod are territorial, and once a suitable habitat has been located they move around very little. This is an important factor that allows some areas to become "fished out" while nearby areas have plentiful stocks. There is a segregation of animals on the basis of sex with the males tending to be on shallower reefs and females in water in excess of 100 feet. In fact, more than 70 percent of the specimens taken by divers are males.

This situation changes during the spawning season, which occurs from November through March with the activity peaking in January. At this time the large, pregnant females move up from the depths to find mates. Eggs are laid in

masses of up to one-half million. The nests range in depth from more than 65 feet in Southern California to less than 25 feet in the Pacific Northwest. In this species the male is the house husband and maintains the nest as the females return to deep water soon after mating. The males guard the nests from predators and keep water flowing over the egg masses by fanning them with their pectoral fins. Lingcod are polygamists and males have been observed taking care of as many as four nests at one time during the seven week incubation period!

The diet of lingcod consists of juvenile rockfish, squid and octopus. Both they and their prey prefer rocky bottoms, where they can find cover. Lings are not active hunters but rather lie on the bottom and wait for their dinner to come to them. They appear as stately dragons with their large, protruding lower jaws. Their olive green and brown mottled coloration serves as effective camouflage.

When hunting for lingcod, a heavier, two banded speargun is generally preferred, since these fish can be more than three feet in length and weigh more than 30 pounds. However, a polespear can be used for the smaller ones. Search along rock outcroppings and in holes. Some divers attach one of the smaller flashlights to the muzzle of their spearguns to

STATELY DRAGON OF THE PACIFIC

TEXT AND PHOTOGRAPHY
BY BRUCE WATKINS



Top: Poached lingcod. Above: A diver surprises a large lingcod in Monterey Bay.

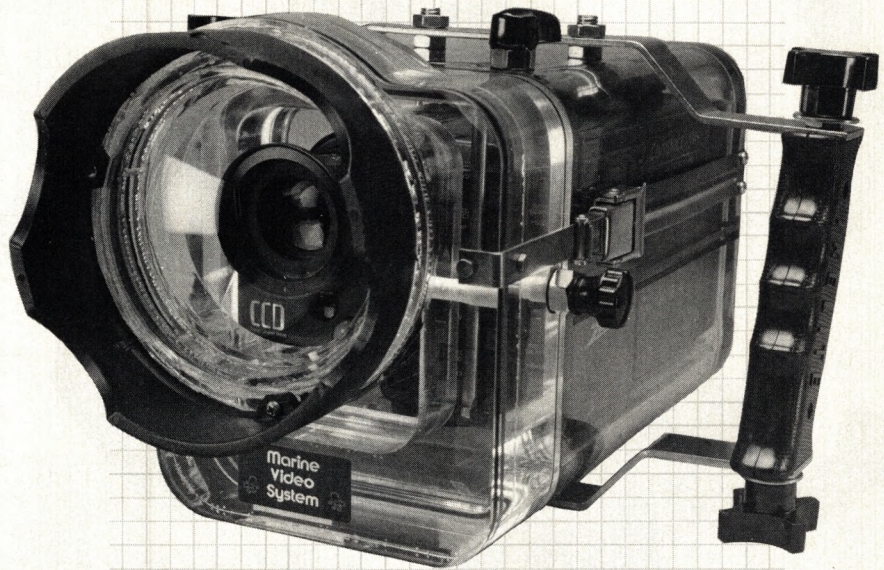
aid in both seeing and aiming.

If no fish are spotted in an area where lings have been seen previously, use an old California diver's trick—take your knife and bang the butt of it on a rock a few times. Lingcod are curious and will often come out of their holes to see what the ruckus is all about. I know of one diver who had a very successful method of hunting lings. He would have his wife fol-

(Continued on Page 144)

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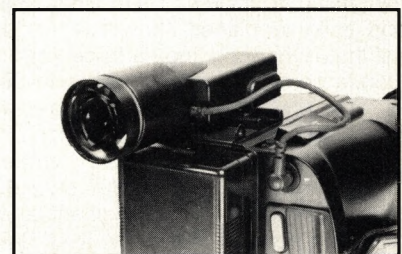
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Flat Port	#6030
Dome Port	#6030.3

[#6030.3 includes wide angle lens]

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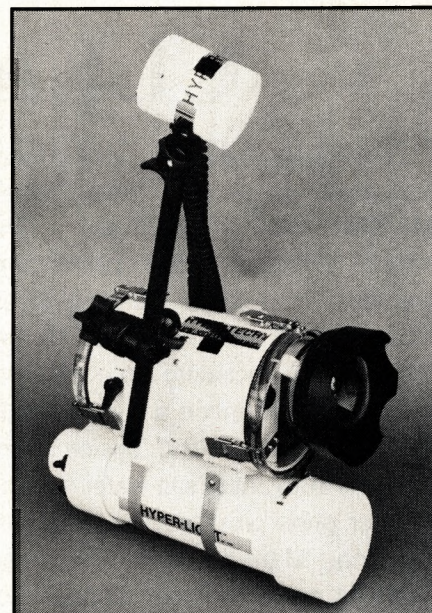
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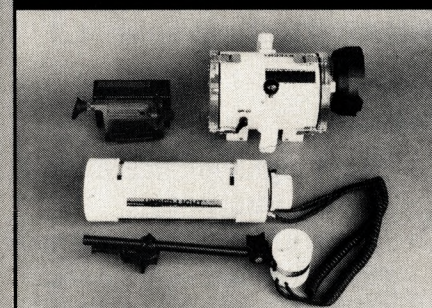
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Hypertech can build U/W housings for any video camcorder or camera/recorder combination on the market today. Four Hyper-Lights are available.



photos/Bonnie J. Cardone

BY JACK MCKENNEY

In this day and age, high impact, high tensile strength plastics are used in everything from kid's toys to automobiles and jet fighter planes. Thus, it seems logical that Hypertech, Inc., a three year old Florida company, would choose to build its video housings and U/W light systems out of this remarkable material, too.

The first industrially used synthetic plastic was developed in 1909 by Leo H. Baekeland. It was known as phenol-formaldehyde-polymer. We know it as Bakelite. Of the literally hundreds of varieties of plastics that scientists have devised since then, polyvinyl chloride, more commonly known as PVC, is one of the more popular and easier to manufacture. PVC is readily found in hardware stores and building supply centers. It is used extensively for plumbing systems and rain gutters. It's impervious to ozone, resistant to many chemicals and virtually maintenance free. With special off-the-shelf solvents, PVC can literally be fused together. And, it can be cut easily, drilled and tapped. Determining its tensile strength requires some complicated engineering calculations, but, by slinging a

cable around an eight inch diameter length of it, you could support a 7,000 pound truck in mid air.

Plexiglass and acrylic have been used to build underwater camera housings for more than 35 years, but PVC is stronger. It is also softer, more easily worked and not as brittle. However, plexiglass does have one advantage; it is optically clear. Thus, most dome ports are manufactured of plexiglass rather than glass. Hypertech uses American made clear plexiglass end plates. These allow the videographer to visually inspect the functioning and waterproof integrity of the unit both at the surface and while underwater. According to a company spokesman, domestic plexiglass has proven superior to imported brands.

Marcus Rankin, Hypertech's 33 year old president, studied architecture at Kansas State University and was accepted as a member of Mensa in 1984. For six years he designed and built acrylic furniture in Washington, D.C. He actually built his first U/W housing for a JVC video camera and recorder. Then he took diving lessons so he could use it. Friends

asked him to build housings for them, so a business was born. Marcus and his staff dive every week, actually testing each design improvement before incorporating it into production models.

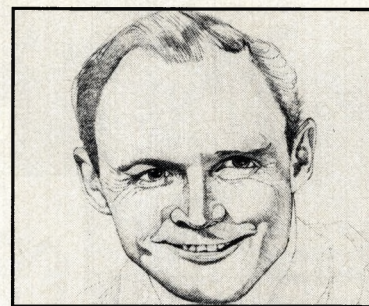
Next to a sphere, a cylinder will withstand pressure better than any other shape, so Hypertech uses PVC cylinders in standard inside diameter sizes of 6 to 15 inches. They can custom build housings for any video camcorder or camera/recorder combination on the market today including the Sony Handycam, Zenith, JVC, Nikon and RCA systems, to name but a few of the more popular ones. And, they build housings for commercial three-quarter inch video systems too. Recently, they began making motion picture camera housings.

Not long ago I took delivery of a Hypertech housing for an RCA Camcorder CLR 200 model. Having been in film for the last 30 years, I was somewhat reluctant to use video, yet intrigued as to what this medium could do for me. From a professional standpoint the best results come from shooting film and transferring it to

(Continued on Page 150)

Technifacts

BY E.R. CROSS



Throughout the world there are many thousands of miles of divable waters that are completely free of detrimental pollution. However, in all countries, there are polluted waters that are potentially hazardous to sport divers. The sources of such pollution are municipal waste discharges carrying infectious agents; industrial wastes containing toxic material and heavy metals; agricultural nutrients that may promote heavy algae growth supporting disease causing microorganisms; and organic pesticides containing potentially harmful matter. There is also a chance of encountering hot water, radioactive water or contagious diseases.

This Technifacts will describe briefly where potential pollution sites may be encountered, why they should be avoided, and the equipment to be used if such an

area is to be safely entered.

For the past two decades there has been increased attention to improving water quality in many countries. This is particularly true in the 25 percent of the world that makes up the overly developed industrial countries such as the United States, Canada, England, Russia, most of Europe, Japan and a few other smaller countries. Improved water quality was obtained mostly through control or elimination of municipal and industrial wastes, particularly the former. In the 75 percent of the world that is undeveloped there are basically no municipal waste treatment systems and little attention to the control, treatment or discharge of either municipal or industrial pollutants. In those countries millions of people die each year from waterborne diseases.

The biggest thrust toward developing clean water has been in rivers and lakes. Since almost all rivers lead to the sea, the impressive improvement in water quality in those bodies of water also greatly improved the water quality along most of the ocean shores. Elimination of some pollutants, better control of others and general public awareness of problems in the aquatic environment have been responsible for continued improvement.

If pollutants are present in a body of water they will not be in a homogeneous mix at different depths. Instead, they may be layered to some extent. Certain kinds of contaminants are more likely to be found in a micro-surface film while others may be in a surface layer to a depth of about three feet. Or, some may be in the rest of the water column and still others

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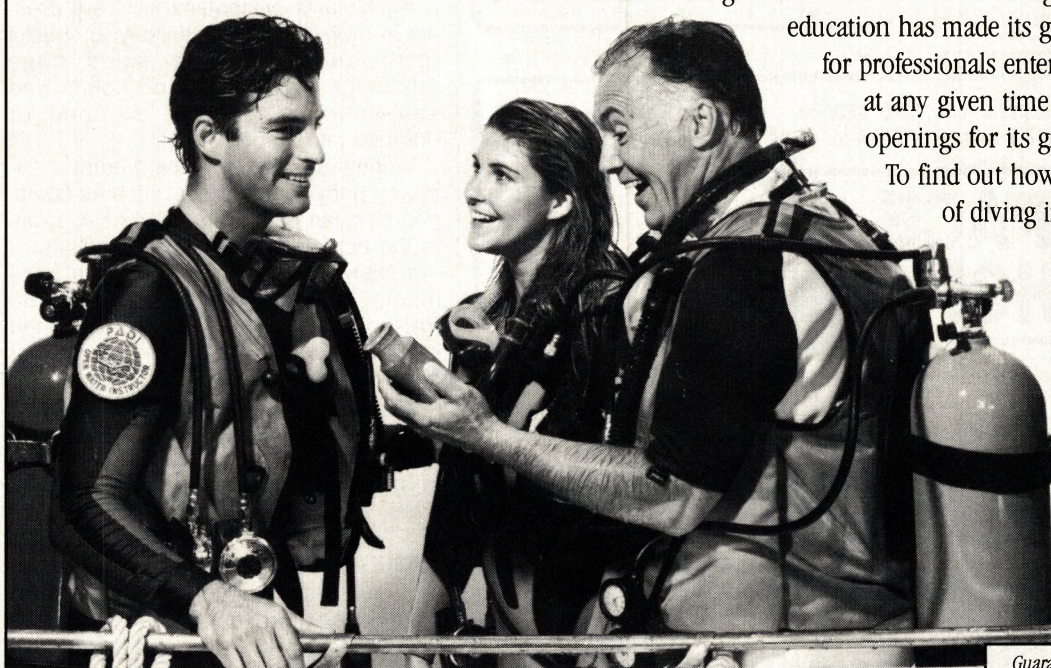
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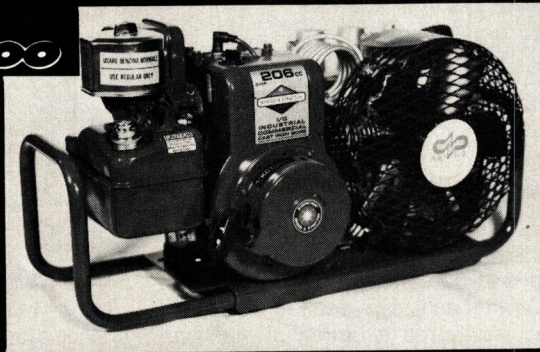
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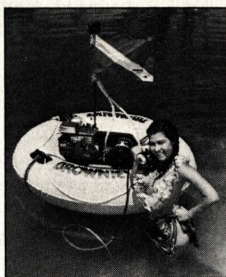
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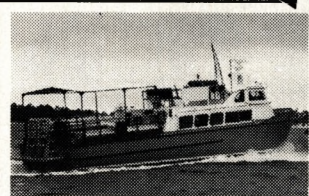
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TECHNIFACTS

may be found in bottom sediments.

A recent report on a study of pollution revealed that the water surface microlayer has a tendency to concentrate toxic material, including hydrocarbons from oil and oil product spills. It was also discovered that some chemicals are absorbed through the skin more readily in diluted form than when in higher concentrations.

One form of microlayer pollution divers may be exposed to is gasoline or other leaking or discharged fuels from boat engine operation. This exposure may be encountered accidentally while snorkeling on the surface or while diving near a boat to clear a fouled propeller or performing other work on boats. It is known that the lighter the hydrocarbon product (gasoline, for example as compared to heavy or crude oil), the more quickly and more severely the reaction will be. Some crude oils cause no reaction at all. Also, the reaction time and its severity is quicker and more serious on wet skin, such as when diving, than if the same substance comes in contact with dry skin.

The first few feet of water are more likely to contain pollutants and contaminants from storm drains and other forms of water runoff. This could include pesticides, toxic chemicals, paint thinners, residues from hydrocarbons spilled on the ground and washed into the storm drains, and all the debris found in streets, roads, ditches and in the fields, barns and farm cattle holding pens.

If pollutants or contaminants are present in midwater they are likely to consist of residue from diesel spills, bilge pumpings from boats and solids and semisolids of sewage pumped or dumped into the water.

When industrial wastes are emptied into any body of still water, such as lakes, ponds, quarries, harbors and quiet areas of the ocean, several kinds of pollutants are likely to be present in bottom sediments. These may include PCBs and PAHs. Heavy metals may also be found in some bays and harbors near power plant discharges and, particularly, in the vicinity of boatyards where poisonous bottom paints, sand blasting wastes and other contaminants are either washed into the water intentionally or flow into the water with rain runoff.

AREAS DISCHARGING WASTE MATERIAL

Some localized zones of intense pollution will remain or periodically occur in any body of water. One persistent area will be in the vicinity of pipelines that discharge various kinds of waste material into the surrounding water. Periodically, there will be discharges from storm

drains. Other areas of localized intermittent pollution include the shorelines of heavily industrialized areas, water in the vicinity of ship and boat repair yards and waters near cattle feed lots and heavily farmed areas. It is these kinds of waters divers should avoid.

Grossly contaminated water is usually apparent and can be avoided. The location of discharge sites of pollutants can be determined for any given area by a little predive investigation at the local level.

EFFLUENT DISCHARGE LINES

Pipelines that discharge waste materials are called effluent lines. They will be found in almost every kind of water environment: lakes, rivers, creeks, ponds, old mine pits and the ocean. A sewage discharge pipe is an effluent line, but so are pipes discharging a lot of other materials, including storm drains from streets and other drained areas. Effluent is usually discharged into a body of water because it is a health hazard in its raw or concentrated form and cannot be used or reused. The body of water into which it is dumped serves as a diluent and thus reduces the potential for harmful concentrations of some, but not all, pollutants.

Divers know that aquatic life in a body of water will be attracted to an effluent line and its associated structures since it serves as an artificial reef and refuge from predators. Some contaminants may become concentrated in aquatic life in the vicinity of effluent lines and they then become toxic.

It is suggested that sport divers refrain from diving on effluent discharge lines of all kinds. Sewage discharge lines are obviously a potential health hazard even when the sewage receives one or more stages of treatment. Discharge pipes for storm drains are carrying everything that was on the ground, in ditches, in streets, on roofs, and refuse of all kinds thrown away by humans and the excreta of animals, including disease carrying ones such as rats, bats, mice and birds. Effluent lines from industrial and chemical plants carry all the unwanted material that will mix with water and flow out a pipe, including some chemicals and metals that are potentially hazardous. The soft, muddy bottoms of still bodies of water such as in lakes and ponds seem to collect and hold residue from effluent lines. Streams and dynamic ocean shores serve as effective diluent systems and most effluent discharged into such areas is rapidly diluted and mixed.

Most effluent discharged into a body of water will be of a different clarity or color than the receiving water and the plume of discharged material can be seen from the surface. Underwater, an area of effluent discharge can usually be noted by the radical changes in the ecological community in the impacted water when compared with adjacent clean waters. Any

(Continued on Page 140)

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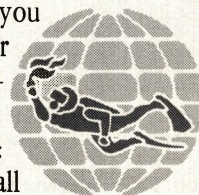


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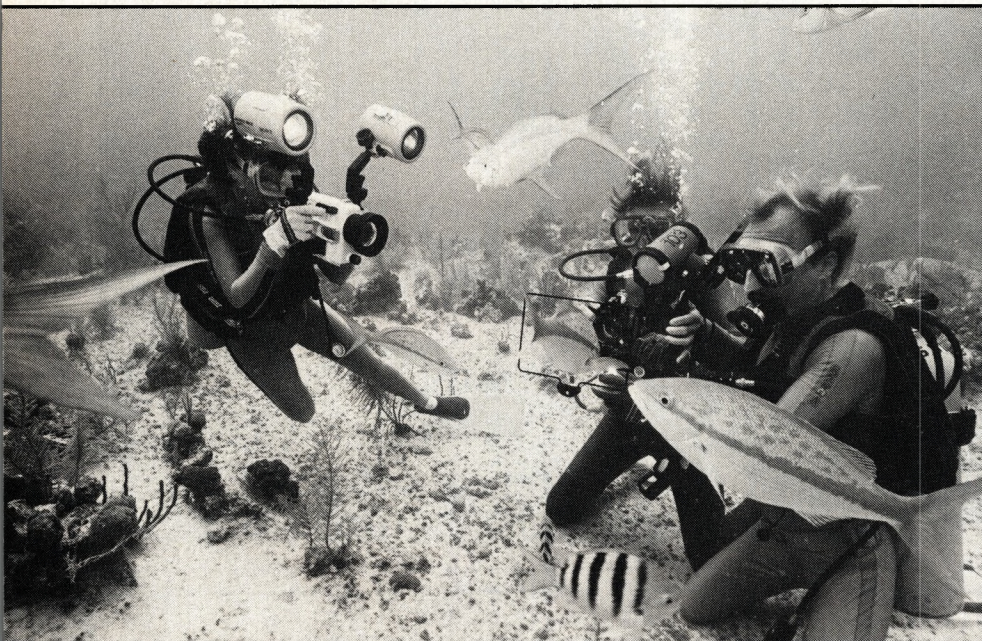




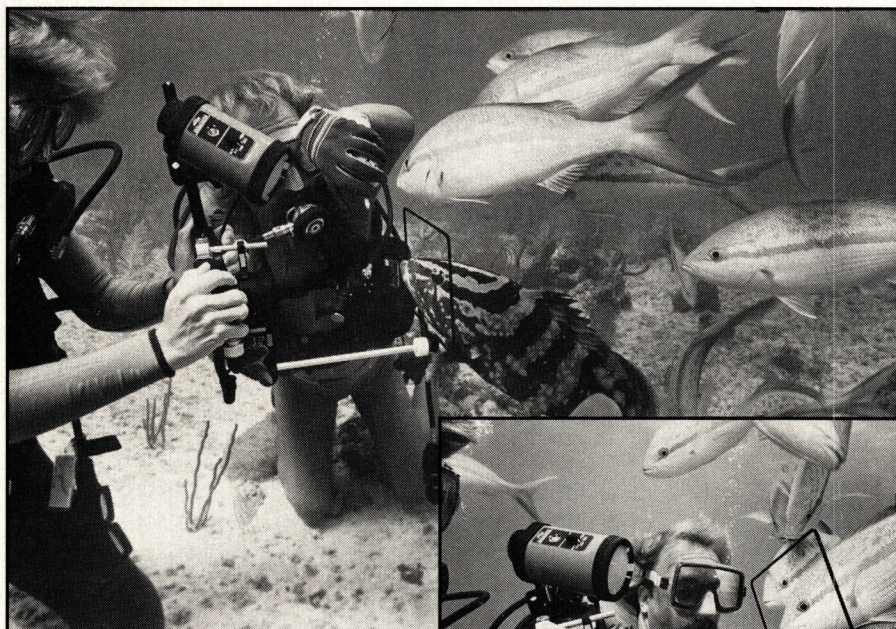
SDMS U/W Video Course

How To Shoot Like A Pro

TEXT AND PHOTOGRAPHY BY JIM AND CATHY CHURCH



Cathy Church demonstrates the proper technique for taking a MS—gliding by slowly. In this case she is shooting with a slightly downward to level camera angle.



Above: This MS identifies the action: A photographer and assistant take close-up photos of fish by offering them food. Right: A level angle CU pinpoints the action. In this case the fish are feeding from a can of cheese spread.

The purpose of this lesson is to help you avoid two common errors: shooting scenes that are much too long and shooting unrelated scenes without a transition from one to the other.

The basic rules are simple: Shoot several short scenes rather than one long one; and, whenever you shoot a new scene, or wish to show a new view of the same scene, change the camera-to-subject distance (to change image size), change the camera angle or change both distance and angle.

CHANGING DISTANCE

Moving the camera closer to or farther away from the subject is the most common method of changing image size because most housed consumer U/W video systems don't have zoom capability. You can change distances to break a long scene into several short scenes. Suppose, for example, that you are shooting a diver feeding or photographing a friendly fish. If you shoot from several feet away to include the diver and the fish, and shoot a long scene to include all the action, your viewer will soon lose interest. Why? Because everything looks the same. Break this long scene into several shorter scenes as described below.

Begin with a LS (long shot) from several feet away to introduce the action. Move in for a MS (medium shot), a few feet closer, to draw attention to what the diver is doing. Move even closer for a CU (close-up) to pinpoint the action. Then, move back for a LS to resolve the action. If you don't want to omit any of the action, move from a LS to a MS and to a CU by moving the camera in closer while shooting. However, if you can shut the camera off between each shot, you will more clearly break the action into several shorter scenes.

Several short scenes of the same subject at different distances, rather than one long scene at one distance, add interest to your video. Each of the shorter scenes implies something new and different is happening because the viewpoint changes. Also, changing camera-to-subject distance in the LS, MS and CU pattern covers abrupt jumps in the action. For example, suppose you shot a LS of a diver swimming toward a coral reef that is barely visible in the background. Then

you shot a CU of the diver's hand touching a coral. The abrupt change between these two scenes is what we mean by jumpy action. How and when did the diver find the coral? The missing part of the action is the MS scene showing the diver approaching the coral. This transition shot hides or eliminates jumpy action.

CHANGING ANGLE

Changing camera angle also implies something new is happening. Suppose, for example, that your subject is a large grouper inspecting his image in a mirror. The grouper looks at his image from the left, from the right and may even look behind the mirror. As you watch his antics through the viewfinder—shooting up to one-half minute of tape at the same camera-to-subject distance—you see interest! However, when viewing the tape, interest may erode quickly. After all, how long can you watch the grouper perform the same antics? However, try shooting about five to eight seconds, turning the camera off, changing the camera angle and then shooting some more. A series of short scenes of the grouper, each with a different camera angle, will be much more interesting to view than a single long scene shot from one angle.

COMBINING TECHNIQUES

To add even more interest and variety, combine techniques: Change both distance and camera angle each time you shoot a new scene. For example, Cathy shot a video sequence of Mike Mesgleski luring yellowtail snappers into Janice Stroud's Nikon close-up framer. Cathy began by gliding in from a LS to a MS with a downward camera angle. This showed the entire cast of characters: the photographers and the fish. Then, holding the camera as steady as possible, she shot a short scene of Mike using a pressurized cheese can to draw the fish into the framer. To add more motion to the scene, she shot another MS shifting from a slightly downward camera angle to a level angle as she slowly circled the photographers. From there she cut to a downward angle MS from behind, over the photographers' shoulders, to show another view of the fish being lured into the framer. Now, to highlight the action even more, she shot both level and upward angle close-up scenes of the fish in the framer. Most of the photographers' bodies were out of frame, but this didn't matter because the fish were the main subjects. Lastly, to end this sequence and to provide a transition to the next, she shot a LS of the photographers swimming away.

ADDING OVERLAP

The overlap technique smooths the jump between two very different but related scenes. For example, suppose you are shooting a diver exploring the U/W caves at Eden Rocks, Grand Cayman or




This upward MS identifies the action, showing both divers and the eager fish.

any other cave or wreck that offers both exterior and interior areas to explore. Here's how you can move from the exterior to the interior of the cave without an abrupt jump in the action: Begin with a LS showing the diver approaching the entrance of the cave and tilt the camera down as the diver swims into the entrance. If the diver swims at an angle toward your camera, this automatically gives you a LS to MS transition. Tilting down emphasizes (or implies) that the diver is swimming down. Then, have the diver swim back out of the cave and you go inside. Using an upward camera angle, shoot the diver swimming through the entrance again and continuing on over your head.

The overlap between the two scenes—the diver swimming down into the opening, followed by the diver swimming in through the opening—provides a natural transition from outside to inside. You can now show the diver exploring the interior and scenes of what the diver sees because the "viewer's mind" has now accepted the inside of the cave. How can you end the cave portion of your video? Just shoot an interior scene of the diver exiting the cave and overlap it with an exterior scene (from a different angle) of the diver emerging from the cave.

CAMERA MOVEMENT

In any of the scenes described above,

hold the camera as steady as possible! If you are zooming in by swimming toward a subject, stop shooting just before your body must stop. If you must use a body movement to stop your motion or accidentally bump bottom, you will jar the camera while shooting. Whenever possible, avoid moving the camera at all—hold it rock steady. Thus, you must be settled on the bottom with your buoyancy under control before attempting to shoot a scene. And, if you must pan (change the camera angle from side to side) or tilt (change the angle up or down) move the camera at an even rate of speed. Jerky movements will be painful to view when you play your tape. 

SELF-ASSIGNMENT

In a pool or open water, choose a simple subject and proceed as follows:

1. Shoot the subject with four different shots: a LS, MS, CU and LS. Practice both shutting the camera off between shots and zooming in from LS to MS or MS to CU.

2. Shoot the same LS, MS, CU and LS pattern again but change both distance and camera angle for each shot.

3. Choose a stationary subject (that may move, but stays in the same basic place) and shoot it at the same distance but from different camera angles.

4. To practice a simple overlap, shoot a diver approaching you and picking an object up off the bottom. Turn the camera off just as he lifts the object. Then, get on the other side of the object (behind the diver) and shoot a second scene as the diver lifts the object and swims away.

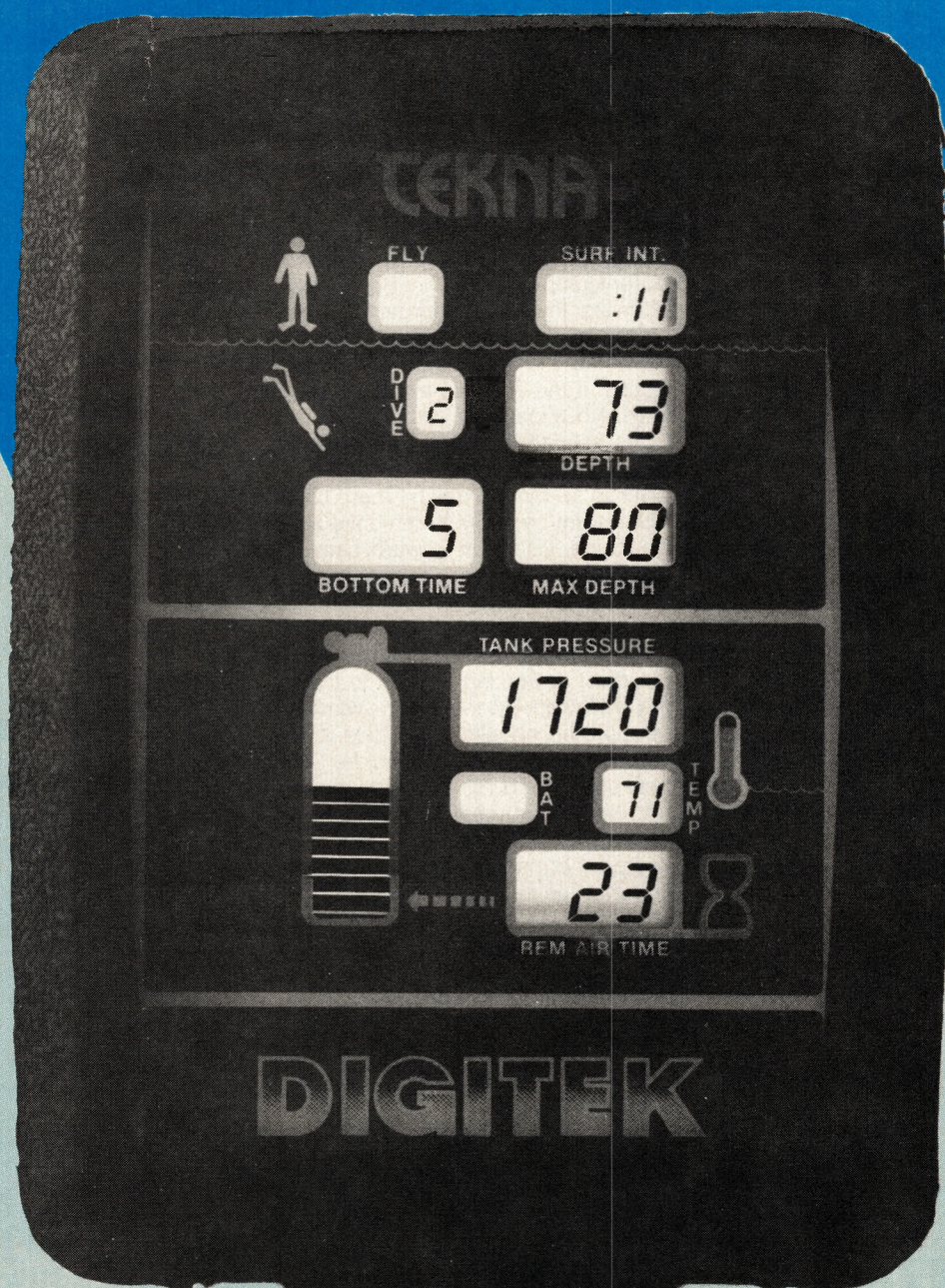
5. Evaluate your work. When viewing this practice tape, see how these simple techniques added variety to your scenes. Also, critically evaluate how steadily you held the camera!

ADDRESS UPDATE

The current address for Aqua Vision Systems (Capsule 8 aluminum housing for the Sony CCD-M8U Handycam) is: 804-A Deslauriers St., Montreal, Canada H4N 1X1. Also, Sea & Sea Canada, 304-1791 Rockland Avenue, Victoria, BC V8S 1X1, distributes Sea & Sea video systems in Canada.

DIGITEK

TEKNA'S AMAZING ALL
DIGITAL DIVE CONSOLE



TEXT AND PHOTOGRAPHY
BY GERI MURPHY

Tekna, well known for its high-tech products, has recently introduced its first fully computerized, all digital dive console. Known as the Digitek, this latest piece of electronic wizardry provides the diver with a full digital display of a multitude of functions involving depth, dive time, tank pressure and temperature. It is the first of a whole new breed of user friendly dive consoles.

The Digitek represents a radical departure in information displays. A large LCD screen is carefully segmented into 11 colorful windows that provide an immense amount of information in one quick glance. The displays include not only numbers but also pictographs that leave a split second impression of your diving status. The Digitek is the first, and at present the only, all digital dive console that features a revolutionary electroluminescent backlighting of its digital display for night dives or low light level situations.

CONSTRUCTION

Weighing 22 ounces on the surface, the Digitek case is constructed of a tough space age plastic. The front window is a curved Lexan plastic that provides high impact resistance, yet a clear view of the displays. The clear window is held to the case by ten stainless steel spring clips and sealed with a neoprene gasket. It is attached to a 32.5 inch long high pressure hose that fits all regulators, including Tekna's own T-2100BX.

Inside the Digitek is an extremely sophisticated surface electronic component circuitry, including a CMOS microprocessor, LCD driver, a temperature sensor, an extremely accurate high pressure transducer, a very sensitive low pressure transducer and a custom transducer conditioning integrated circuit.

The entire system is powered by a 3 volt Tekna 2/3 A lithium power cell (catalog no. T-1021). It can be quickly and easily changed by the user when the Digitek indicates the battery is low.

The Digitek is completely automatic and has no outside switches or control knobs of any type. Opening the scuba tank valve automatically activates the Digitek screen and displays. Descending to a depth greater than seven feet automatically switches on the dive displays including depth, bottom time and so on. Ascending to a depth of four feet or less automatically switches the Digitek into surface interval mode and starts the surface interval timer. When the ambient light drops below a comfortable reading level, the Digitek automatically backlights the entire display.

The entire Digitek Console is encased in an extra thick boot that protects it from hard knocks, bumps or scratches.

The performance parameters of the Digitek encompass any normal situation in sport diving and more: It numerically displays tank pressures of up to 3,250 psi. And, the pictograph shows tank pres-

sures up to 3,000 psi. The Depth and Max Depth digital displays record depths down to 220 feet and every Digitek case is tested to a working pressure equivalent to 250 feet.

DISPLAYS

The Digitek is equipped with a very high contrast liquid crystal display (LCD) screen. The numerals are sharp and the screen can be read even at a 45 degree angle. However, the design of the LCD screen and the various displays make the Digitek unique in dive console design.

The background of the Digitek face is a light charcoal gray. Eleven variously sized and shaped windows reveal bright LCDs of numerals and pictographs.

The windows have been grouped and color coded for easy reading. For example, the tank pressure windows are outlined in fluorescent green, while the remaining air time and bottom portion of the scuba tank window are outlined in fluorescent orange to denote warning.

Surface functions such as Surface Interval Time, Fly Indicator, Dive Counter and Low Battery warning are all outlined in white. Depth and Max Depth are outlined in two different shades of blue. The

end result is that complementary functions are linked together by color as well as position.

Equally important is the fact the 11 different windows provide an overall picture of the dive profile at any given time. Each LCD window has its own separate and single function, so there is no confusion over whether the numerals mean one thing or something entirely different.

There is also a natural arrangement or grouping of the windows in logical order. The overall screen has been divided into three segments. The top segment, which is shown above water, includes the flight indicator and the surface interval timer. This segment shows a diver standing above the surface.

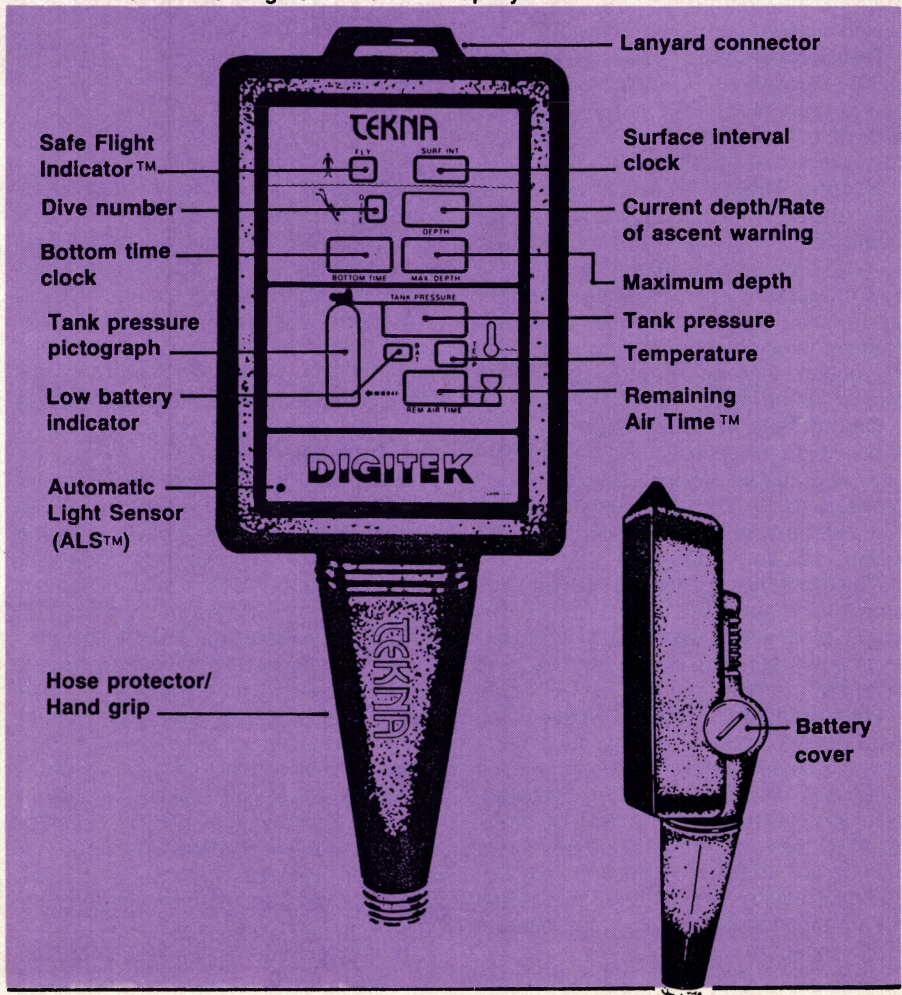
The middle segment contains diving information such as current Depth, Max Depth, Bottom Time and Dive Number. This segment is illustrated by a descending diver.

The bottom segment is clearly devoted to tank pressure as it contains a pictograph of a scuba tank plus an hourglass representing remaining air time.

FUNCTIONS

The Digitek performs a total of 19 func-

When the Digitek's automatic light sensing circuit senses low ambient light, the electroluminescent backlight switches on to make the display images stand out in sharp contrast. Below: The Digitek has 11 displays and 19 automatic functions.



tions, making it one of the most informative dive consoles on the market today. It is as sophisticated as most dive computers, both in electronic design and the information provided. Here is a list of the 19 functions the Digitek performs:

Auto Turn On: The Digitek automatically turns on its LCD screen when the regulator is attached to the tank and the tank pressure is turned on. The Digitek turns itself off when pressure is drained from the regulator and a 12 hour surface interval has elapsed.

Auto Dive Mode: The Digitek automatically switches on the current depth display, the dive counter and bottom time counter when the user reaches a depth of seven feet or deeper.

Dive Counter: The dive counter keeps track of the total number of dives and displays from 1 to 9 dives. It resets itself to zero after a 12 hour surface interval.

Current Depth: The Digitek provides a numerical display of current diving depth from 0 to 220 feet.

Ascent Rate Warning: The depth display also serves as an ascent rate warning indicator by flashing when the diver's ascent rate exceeds 60 feet per minute.

Max Depth: The Digitek also displays maximum depth for the deepest part of the current dive. This will always be rounded off to the deepest ten foot increment in accordance with the U.S. Navy Diving Manual tables.

Depth Overrange Warning: The Max Depth display also serves as a depth overrange warning indicator by flashing if a diver exceeds the Digitek's maximum depth range of 220 feet.

Bottom Time: The Bottom Time display keeps track of the diver's time below seven feet on descent and four feet on ascent. This display resets to zero if a new dive begins after a surface interval of ten minutes. If the surface interval is less than ten minutes, the Digitek will continue the bottom time count and regard it as part of the original dive.

Digital Tank Pressure: Tank pressure is displayed numerically and can read as high as 3,250 psi. This display rounds off pressure to the lowest ten psi increment. For example, a pressure of 2,898 psi would read as "2,890 psi."

Pictographic Tank Pressure: Tank pressure is also displayed in the pictograph of a scuba tank. Each LCD bar segment in the tank equals 200 psi. The pictograph reads from 200 to 3,000 psi.

Remaining Air Time: The Remaining Air Time projects the approximate number of minutes before the diver will run out of air. This display is based on the actual air consumption of the user, as monitored by the Digitek. Air consumption estimates are based on a continuously updated breathing rate average. For the last 10-15 minutes of the dive, it is accurate to the minute.

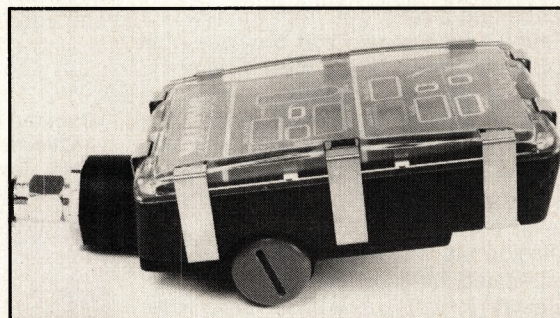
Low Tank Pressure Warning: Both



Left: The Digitek has one of the most colorful and creative LCD screens on the market today. Below: It is powered by a special 3 volt Tekna 2/3 A lithium battery that can be changed by the owner when the computer indicates it is low on power.



The clear Lexan plastic cover of the Digitek is secured by ten stainless steel spring clips and is sealed to the case by a neoprene gasket. It provides a clear view of the various displays. The Digitek attaches to the high pressure hose of the diver's regulator.



the pictograph and numerical tank pressure displays begin flashing below 500 psi. This advance warning provides adequate time and air for the diver to return slowly and safely to the surface.

Ambient Temperature: A Temperature display indicates the degrees Fahrenheit of the surrounding water or air. This display is designed to work above or below the surface and has a range from 0 to 99 degrees.

Low Battery Warning: The abbreviation BAT appears in the battery display window when the Digitek battery has lost a major portion of its capacity. When the battery is almost completely exhausted the BAT symbol will begin flashing.

Auto Surface Mode: The Digitek automatically switches from dive mode to surface mode upon reaching the depth of four feet or less. This is activated by the low pressure transducer.

Surface Interval: Once in surface mode the surface interval display begins counting the minutes and hours spent on the surface between dives. The hours are separated from the minutes by a colon. This timer will continue counting elapsed time up to 12 hours.

Dive Log: Ten minutes after surfacing, the Digitek begins scrolling dive profile

information from the four most recent dives. This includes dive number, bottom time, maximum depth and surface interval time. The most recent dive will be displayed for seven seconds and the three prior dives will be displayed for three seconds each. This scrolling of log sequences will repeat continuously for up to 12 hours after the last dive, facilitating entry of information into a logbook.

Safe Flight Indicator: The Safe Flight Indicator tells the diver when outgassing has sufficiently reduced nitrogen levels for safe high altitude flight. A pictograph of an aircraft will appear in the display window 12 hours after the last dive, announcing it is OK to fly. This display is based on the U.S. Navy diving tables.

Internal Error Warning: Any time the Digitek console detects an internal electronic error, all active displays will begin to flash. All dive information will continue to be available to the user, but the flashing displays indicate the possibility of an error. At this point, diving with the Digitek should cease until the unit is serviced. (This service may only require resetting the Digitek, by simply removing the battery and reinstalling it 10 seconds later. However, the battery reset will erase all

(Continued on Page 132)

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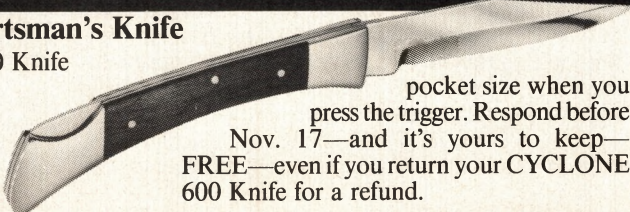
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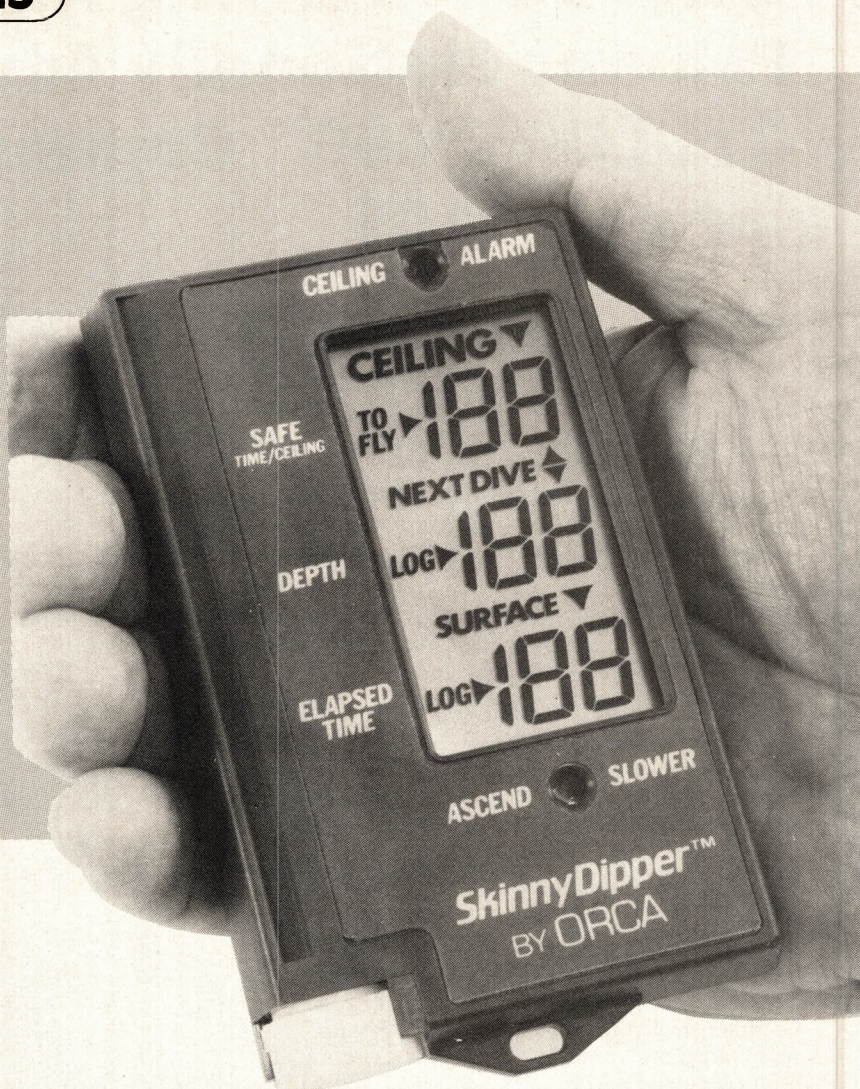


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SKINNY DIPPER

ORCA'S SECOND GENERATION DIVE COMPUTER

TEXT AND PHOTOGRAPHY BY GERI MURPHY



The SkinnyDipper is a compact, lightweight computer specifically designed for no-decompression sport diving. Don't be deceived by the lighthearted connotation of its name. This little device is one of the most ingenious dive computers to hit the market this year.

Descended from the world famous Edge, the SkinnyDipper features an extremely bright LCD screen with large bold displays and flashing warning lights. It contains many exciting innovations that make it easy to interpret.

The SkinnyDipper represents another milestone in the evolution of dive computers. It is user friendly, attractively priced and loaded with safety features. And, it is the first American dive computer to feature glowing and flashing LED warning indicators, as well as an LCD screen.

The SkinnyDipper has been designed and produced by Orca Industries, the same people who developed the Edge. This instrument has proven a trustworthy pioneer of both dive computers and the multilevel decompression concept.

The difference between the two dive computers is the Edge is a full decompression instrument while the SkinnyDipper is basically a no-decompression device. Orca will continue to produce the Edge while expanding its market base to sport divers via its latest offering.

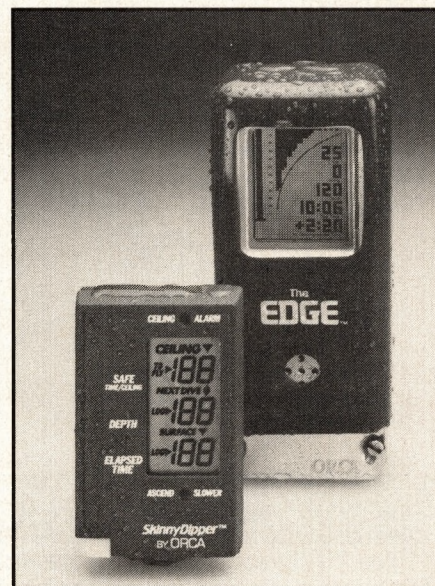
Both the SkinnyDipper and the Edge

use the same multilevel decompression formulas. These tables have been tested over the past four years. No less than 300,000 dives have been made by Edge users. The calculations for the tables are based on 12 different tissue rates within the human body and tissue half-times range from 5 to 480 minutes. This unique multilevel decompression formula is based on the greatest number of tissue half-times.

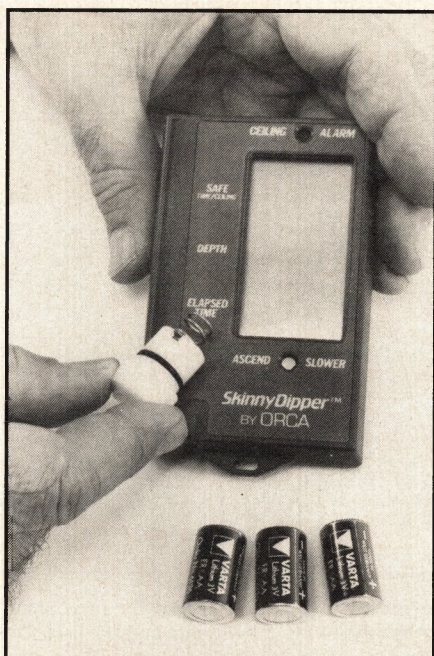
While the SkinnyDipper is designed as a no-decompression instrument, it will assist a diver should he or she accidentally end up in a decompression situation.

One-quarter the size of the Edge and less than one-quarter its weight, the SkinnyDipper is about the size of a deck of cards. It weighs 5.5 ounces. The small size was made possible by the use of space age plastics and advanced computer circuitry design. The case is constructed of a molded, high impact, reinforced ABS plastic. The view window is made of clear Lexan.

The LCD screen is 1.25 inches wide and almost 2.5 inches tall. While this may



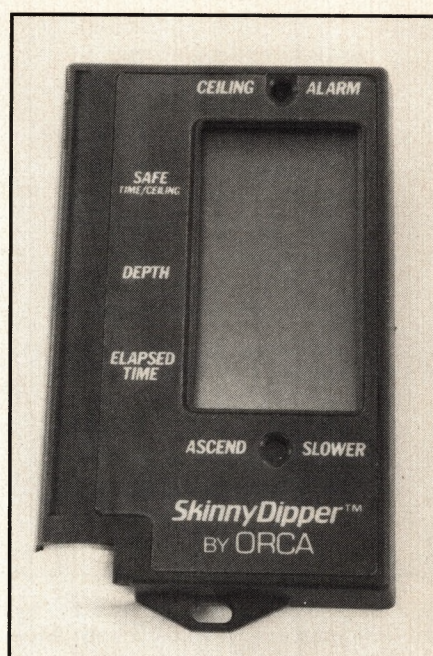
The SkinnyDipper is a compact dive computer specifically designed for no-decompression sport diving. Descended from the Edge, the SkinnyDipper is smaller.



The SkinnyDipper is powered by three lithium 3v ER ½ AA batteries. They will last 2-3 years for the average sport diver.



The SkinnyDipper comes with a holster, wallet, lanyard ring and attachment for a console high pressure hose (not shown).



The screen is blank when the power switch is in the off position. Extra large numbers are displayed when it's on.

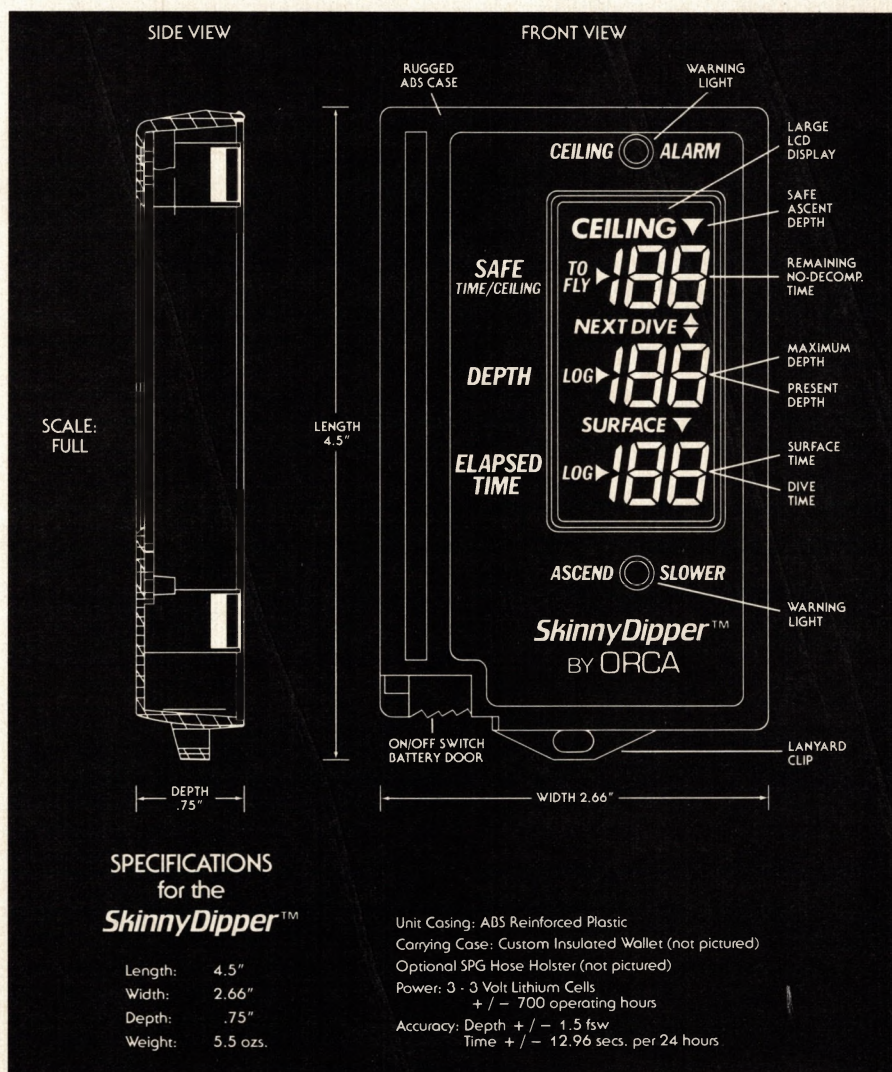
seem small at first, it is more than sufficient because of the SkinnyDipper's alternating screen displays. No more than three sets of numbers appear on the screen at one time, thus greatly reducing the possibility of confusion.

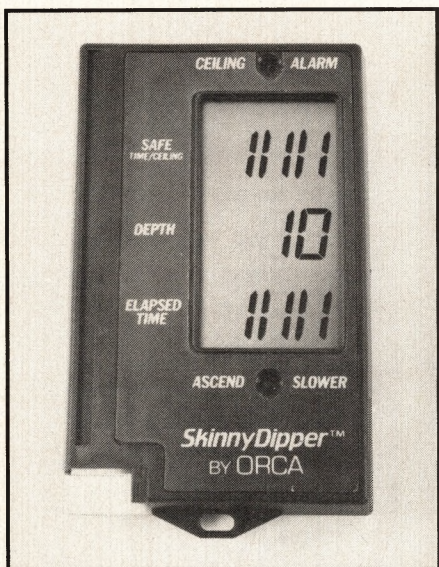
The numbers are one-half inch tall, making them the largest LCD numeral displays of all dive computers. They can be read through a foggy mask, murky water, in dim lighting at depth or during night dives. They are a welcome innovation for nearsighted divers.

The SkinnyDipper is one of the first American designed dive computers to employ the use of flashing red LEDs as warning indicators. A decompression alarm is positioned directly above the LCD screen and a rate-of-ascent alarm is positioned directly below the screen. These two indicators begin to flash red whenever a diver is starting to get into trouble. They are hard to ignore, especially when at depth.

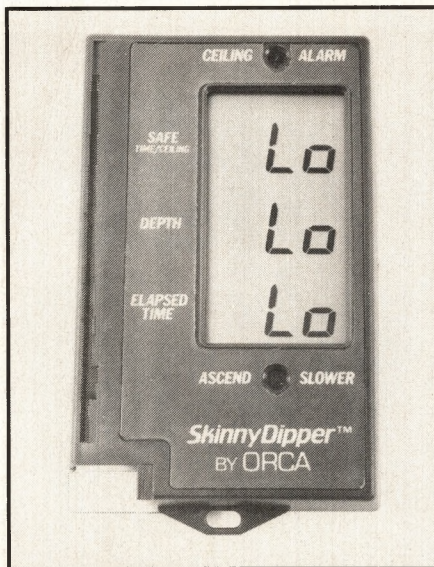
The SkinnyDipper is powered by three, 3 volt ½ AA lithium batteries. They are designed to provide 500-700 hours of continuous running. This amounts to an estimated one and one-half to two years for the average diver. However, if the SkinnyDipper were turned on and used continuously day after day, a set of batteries would last approximately three weeks.

The neat thing about the SkinnyDipper is that the batteries can be replaced by the user; the computer does not have to be returned to the factory or the dealer. Divers can obtain special batteries from their Orca dealers or major camera stores. The best battery for this instrument is a Varta, lithium 3V, ER ½ AA (or-

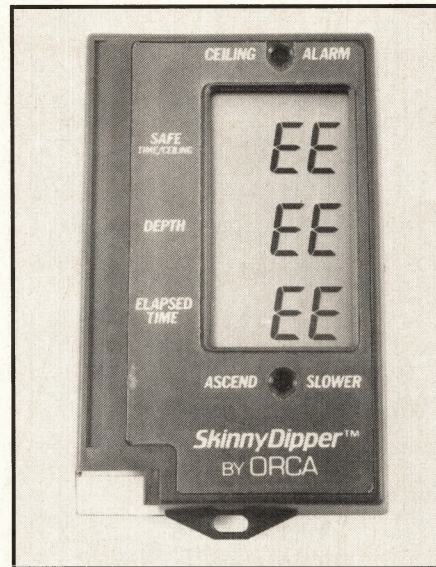




Self-diagnostic check start: The number 10 indicates the version of software.



Self-diagnostic check: Screen displays messages such as this low battery signal.



After the low battery signal, the next alpha message is the display for computer error.

der no. 6126). They cost approximately \$5.95 each. A set of fresh batteries should last the average sport diver one and one-half to two years.

The batteries can be quickly removed by simply pushing inward on the rotating on/off switch and turning it counterclockwise one-eighth turn. The battery compartment door is fitted with an O-ring for pressure sealing; a coil spring keeps the cap from being opened accidentally.

The SkinnyDipper can be worn several different ways, depending on the diver's preference. A stainless steel ring at the bottom of the case allows the computer to be attached to a lanyard. An optional case holster is available from the manufacturer and allows the computer to be attached either to the pressure gauge's high pressure hose or strapped onto the

wrist or forearm via two Velcro straps. Orca also provides a small custom wallet for protecting the unit during travel.

It should be pointed out that the SkinnyDipper is an independent dive computer, it is not integrated with tank pressure.

23 FUNCTION COMPUTER

Although the SkinnyDipper may appear to be small, it is an extremely powerful computer that can monitor a variety of diving factors while continuously calculating the no-decompression situation.

The following is a listing of the SkinnyDipper's 23 different functions:

- 1) Self-Diagnostic check of all circuits and readouts when initially turned on.
- 2) LCD readout of computer software version (presently 10).
- 3) Three automatic low battery dis-

plays—"Lo," "LoLo," and "LoLoLo"—as battery energy drops.

4) Automatic computer error display "EE" when circuit malfunction occurs.

5) Automatic out-of-range warning—"or"—when diver goes below 199 feet.

6) Automatic ascend warning display "go up" when diver exceeds the no-decompression time limit at depth.

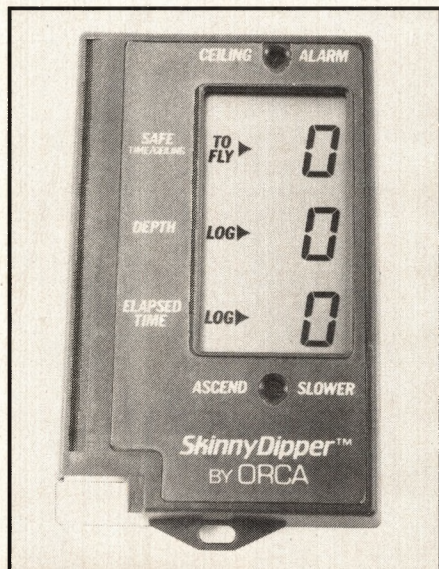
7) Automatic remaining battery power display "155 to 29" on startup as energy diminishes.

8) Automatic ambient atmosphere pressure display "32, 33 or 34" when at sea level.

9) Automatic scrolling of depth and time displays for no-decompression limits from 30 to 130 feet.

10) Automatic counting and display of surface time prior to dive.

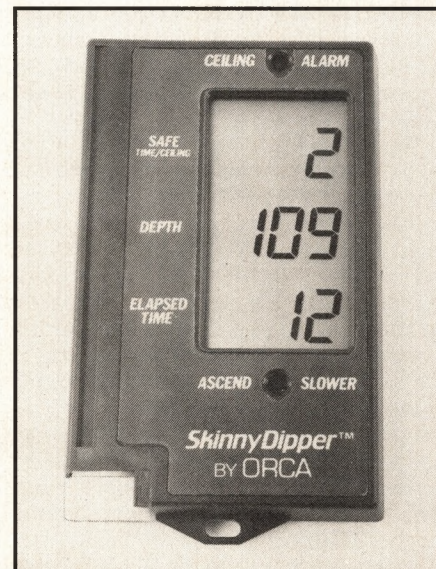
After scrolling no-decompression limits, the screen displays previous dives.

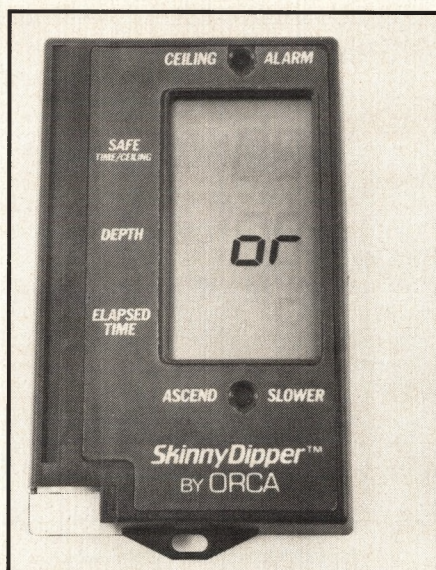


If a dive is not started within 60 minutes of turn on, the computer will shut itself down.

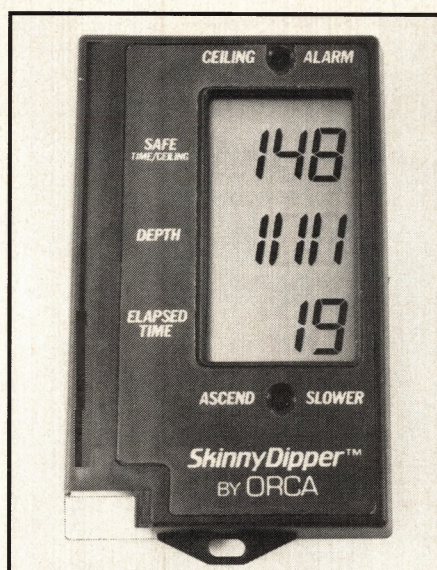


On a dive the screen shows remaining no-decompression time, depth and dive time.

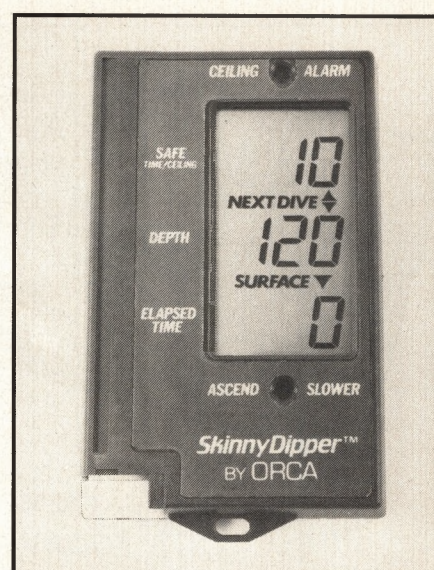




Following the arrow display is the alpha character message for out of range.



The final self-diagnostic display is battery power (top) and altitude range (bottom).



After self-diagnostic check the screen scrolls no-decompression time limits.

11) Automatic computer power-down if surface time exceeds 60 minutes prior to the first dive. This function conserves battery energy.

12) Depth display from 5 to 199 feet with an accuracy of within 2 feet.

13) Automatic counting and display of elapsed time during dive.

14) Automatic counting and display of remaining time for a safe no-decompression dive.

15) Automatic flashing LED decompression alarm when the diver has exceeded no-decompression limits.

16) Automatic flashing ceiling display for shallowest recommended decompression stop.

17) Glowing LED warning light when diver exceeds the prescribed rate-of-ascent. This rate varies with three different

depth zones.

18) Automatic log display of maximum depth once the diver has surfaced.

19) Automatic log display of total dive time once the diver has surfaced.

20) Automatic counting and display of surface time.

21) Automatic counting and display of required surface time prior to aircraft flight in pressurized (8,000 feet) passenger cabin.

22) Automatic low power mode—"off-off"—when tissues are clear of nitrogen.

23) Automatic scrolling of time and depth displays for no-decompression limits on next repetitive dive.

OPERATION

During a day of diving, the SkinnyDipper moves through a series of suc-

ceeding operation modes that, in turn, reflect a number of different displays on the computer's screen. Each of the displays is designed to be simple to read, yet the combination of all of them amounts to a tremendously sophisticated instrument.

In order to better understand the power of this dive computer, we will go through all of the SkinnyDipper's operation modes and their related screen displays:

Power Off Mode: When not in use the SkinnyDipper battery power is completely switched off and the screen will be blank. This is the mode in which the SkinnyDipper is stored between dive trips.

If the SkinnyDipper is turned on and accidentally left on without use, it will automatically power down in 60 minutes. This is an energy saving safety circuit that prevents the accidental drain of batteries.

COMPARISON OF NO-DECOMPRESSION LIMITS (in minutes)

DEPTH	U.S. NAVY	DATAMASTER II	EDGE	SME-ML	GUIDE***	SKINNYDIPPER
30'	NL	220	234*	215	NL	234*
35'	310	160	NDD	NDD	NDD	NDD
40'	200	120	136	132	125	136
50'	100	70	77	74	75	77
60'	60	50	53	53	51	53
70'	50	40	40	38	35	40
80'	40	30	31	29	25	31
90'	30	25	24	23	20	24
100'	25	20	19	18	17	19
110'	20	15	13	13	14	13
120'	15	10	11	11	12	11
130'	10	5	9	9	10	9
140'	10	0	7	7	9	****
150'	5	0	7	6	DR	
160'	5	0	6	5	DR	
170'	5	0	5	4	DR	
180'	5	0	**	4	DR	

DR = Decompression Required

NDD = Next Deeper Depth

NL = No Limit

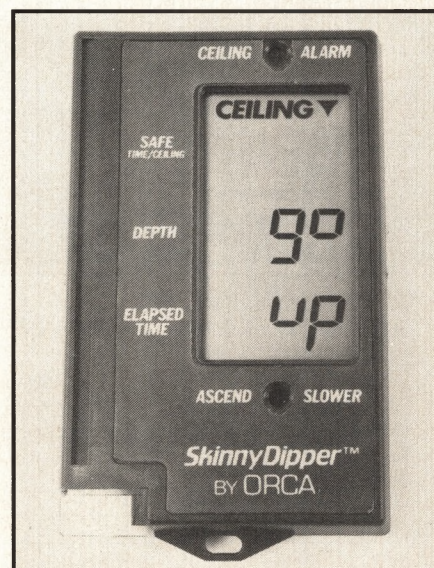
* = Certain times will vary slightly according to conditions

** = The Edge cannot be used below 170 feet

*** = A one minute stop at 10 feet is recommended at the end of every dive

**** = The SkinnyDipper is not intended for use below 130 feet

Exceeded no-decom. time: "Go up" means ascend. "Ceiling" means possible stop.





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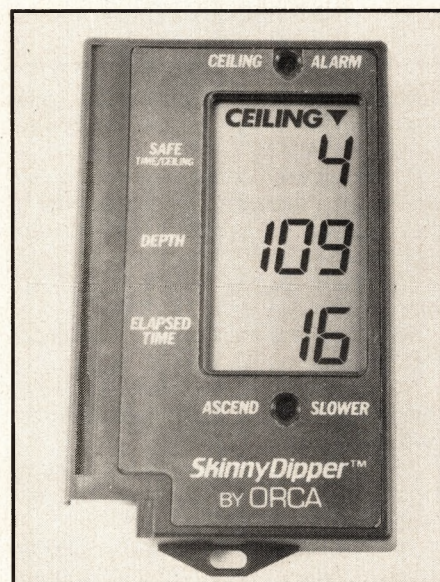


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SKINNYDIPPER

When the SkinnyDipper shuts itself down, the LCD screen will display the word "OFF" in vertical fashion. To begin a new dive the unit must be re-initialized.

Power Up Mode: The SkinnyDipper must be turned on manually while the diver is still on the surface. This is true with almost all dive computers, as the computer must zero out its pressure transducer to atmospheric pressure on the surface. It will also run through a self-diagnostic check of all functions. If the div-



The SkinnyDipper indicates you are in decompression mode by displaying the word "ceiling" and indicating the number of minutes required for safe decompression.

er attempts to turn on the computer while underwater, an error display will indicate improper power up procedure.

When the SkinnyDipper is first switched on, it will go through a complete self-diagnostic check of all electrical circuits and functions. During this procedure, it will exhibit eight different displays in the LCD window plus a testing of the two LED warning indicators.

The first display will be a numeral by numeral formation of the three rows with each row showing a 188. This is followed by a display of all numbers and labels, such as CEILING, TO FLY, NEXT DIVE, LOG, SURFACE and so on. This indicates all basic LCD segments are functioning.

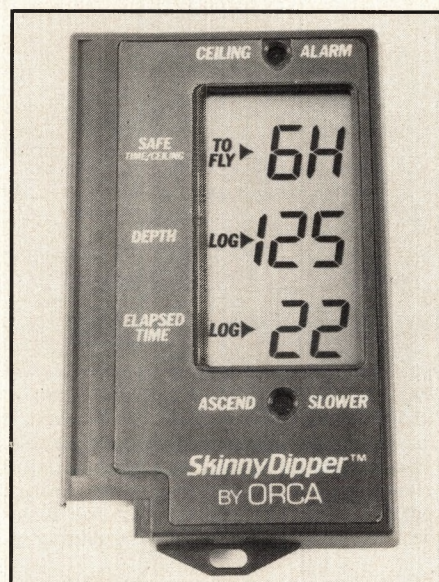
At the same time, the two red LED indicators will light up. The top one flashes while the bottom one glows steadily. This indicates the LED lights and circuits are all functioning.

One second later, the screen will change to a strange display of vertical lines on the top and bottom rows and a number indicated in the middle row. The

number indicates the specific version of computer software being used. At present, the display 10 represents version 10, the first version to be distributed. Should Orca improve or change the software program at a later date, a different number would appear.

In another second, the screen will display three rows of the letters Lo. This indicates a battery test by the computer and a check of the displays. This is followed by another display that shows three rows of EE. This indicates a check of the computer error circuitry.

Next is a display that simply says "or," which indicates a check of the out of range function. This is followed by a display of "go up," the computer's warning



Upon surfacing from a dive, the SkinnyDipper will tell you how long before you can fly (top), maximum depth attained (center) and total dive time (bottom).

to begin ascent.

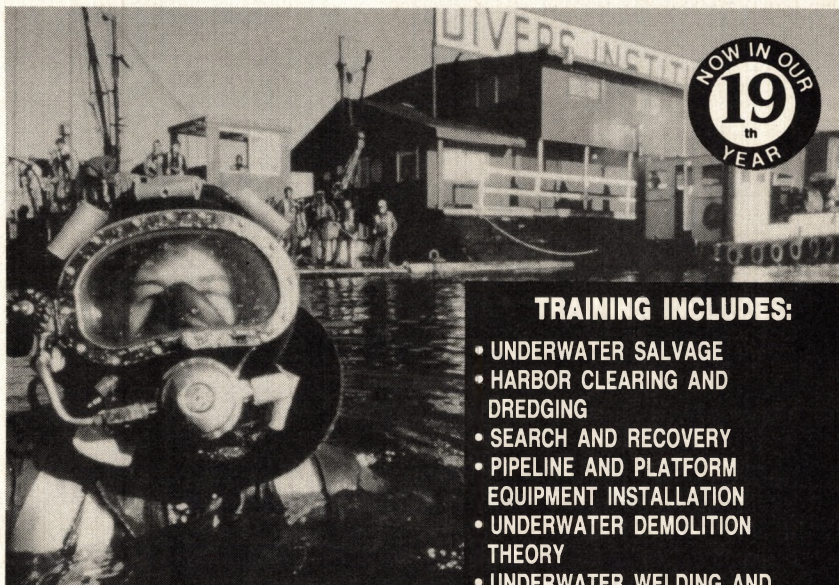
The final display shows vertical lines in the center row with numbers in both the top and bottom rows. The top numbers can be anywhere from 155 to 29 and indicate the amount of electrical energy remaining in the batteries. With fresh new batteries, the computer will give a high reading of 155. This number will diminish with use until it reaches 29, when the computer shuts itself down. No new dive should ever be initiated with a number lower than 46.

The bottom row number is a check of the computer's pressure transducer. The number reflects atmospheric pressure at sea level and should read either 32, 33 or 34. If the user is diving in a lake at altitude (no more than 2,000 feet) the number will be somewhat lower. However, if the reading is greater than 36 or less than 20, the computer will not function properly.

Surface Mode: Once the SkinnyDipper has completed its self-diagnostic check, it will immediately go into surface

(Continued on Page 66)

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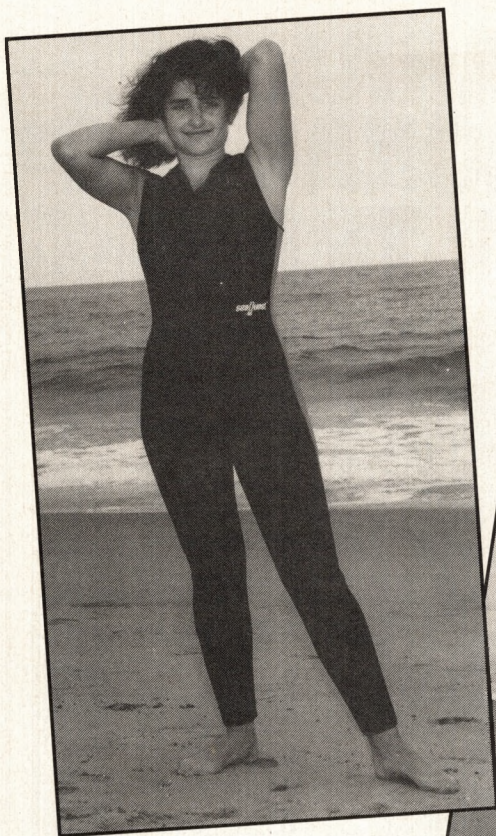
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Pam Cardone models the 6.5mm version of the Capri. Designed just for women, it is navy blue with fuchsia accent panels. The farmer jane has a Velcro closing shoulder. The step-in jacket has French cut legs. The Capri can be color coordinated with other SeaQuest/Mares dive gear.

THE SEAQUEST CAPRI

FOR WOMEN ONLY

TEXT AND PHOTOGRAPHY BY BONNIE J. CARDONE

It's kind of a kick for me to find dive gear designed especially for women. I suppose this is because so much of the equipment we use was made for men and only adapted for use by women. Few items have had us solely in mind at their conception. This is not the case with the Capri wetsuit, illustrated on this page. SeaQuest designed it just for women. And, keeping in mind that we like color, the company offers us a whole line of matching accessories.

The Capri is navy blue with fuchsia accents and has an optional, matching hood. You can choose a mask and snorkel in either fuchsia or blue—there are several different styles—to complement it. Need a pair of fins? SeaQuest/Mares sells adjustable heel strap Power Planas or full foot Planas in blue or fuchsia as well as Avantis in blue. You can also get a BC jacket in navy with fuchsia accents.

The SeaQuest Capri—for women only—comes in either 6.5mm (one-quarter

inch) or 3mm (one-eighth inch) thicknesses. It is an attractive wetsuit with nylon both inside and out. The farmer jane has an attractive V-neckline. One shoulder closes with Velcro. The body of the suit is navy blue; slimming fuchsia panels accent the sides. Both versions of the suit have plush nylon inside. The 6.5mm suit has a spine pad to help prevent water exchange, keeping the wearer warmer. Knee pads on the outside of this suit provide protection and extend its life.

The step-in jacket features a high neck for warmth. The raglan sleeves provide a good fit for a wide variety of female shoulders. The legs are French cut for freedom of movement. A heavy duty plastic YKK zipper makes donning the jacket easy. The fuchsia panels on the sides and sleeves add a colorful contrast.

Both the jacket and the farmer jane appear to be very well made. There are gussets under the arms and at the crotch for comfort and ease of movement. All

seams are both sewn and glued to reduce water leakage. All edges are bound with stretchy Lycra seam tape for both good looks and durability.

The Capri wetsuit comes in five sizes: 6, 8, 10, 12 and 14. The 6.5mm version (\$325) is recommended for temperate waters such as those found off California or the East Coast of the U.S. The 3mm suit (\$245) is ideal for warm water diving. In many places in the Caribbean, the two tank morning dive profile consists of a deep wall dive followed by a much shallower coral reef dive. Wear the farmer jane and the jacket on the wall dive; in the shallows either the jacket or the farmer jane alone will suffice.

The SeaQuest Capri—for women only—is a colorful, versatile wetsuit that is comfortable and warm. It's fun to pick out matching accessories. See the Capri and the other products in the SeaQuest/Mares line—there are many for men, too—at your nearest dive store. 

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U.S. TECH VANGUARD SPORT

TEXT AND PHOTOGRAPHY BY ERIC HANAUE

Perhaps it is a sign of the coming of age of the diving industry, but private label regulators have arrived. These products bear the brand name of a distributor and are made by original equipment manufacturers (OEM). Often, the same manufacturer will make regulators for two or three different firms, all just a little bit different but bearing the same heritage. A knowledgeable diver can often spot the family relationships.

You will find no radical engineering among the private brands. These regulators usually follow the mainstream of design, with perhaps a few cosmetic additions. But, because of the advances in design that have been made in the last five years or so, most of them outperform the top performers of the mid '70s.

U.S. Tech's Vanguard Sport is an example. Distributed by Berry Scuba of Chicago, Illinois, it is the lower priced companion of the Vanguard Professional, reviewed in the January 1987 issue of SKIN DIVER. Both regulators are produced by

an original equipment manufacturer in California and sold exclusively by Berry Scuba. U.S. Tech products include buoyancy compensators, consoles and gauges as well as regulators. All are made in the U.S.A.

The Vanguard Sport has the same first stage as the Professional and that's good news. This is a flow-through, balanced piston design that has been around several years, but is now used exclusively for U.S. Tech products. It is light, compact and attractive with no unsightly fittings or exposed rough edges. A knurled swivel end cap accommodates four low pressure hoses, while two high pressure ports are on the housing. At first the swivel feels tight, but it loosens when the system is pressurized. Inside, the cavity around the piston orifice has been enlarged to increase its air reservoir. A greater volume of air within this chamber helps to balance the regulator and maintain its 140 psi intermediate pressure, even under high demand.

Environmental protection is provided by seven small orifice ambient pressure openings around the perimeter of the housing. These orifices are not intended for injection of silicone grease. They prevent large sand grains and similar contaminants from entering the piston chamber. Although Vanguard regulators are environmentally protected against polluted water, they are not recommended by the manufacturer for use in ice diving.

Quad O-rings are used throughout the Vanguard Sport. These have two sealing surfaces, so if one goes bad the other will still seal. Another advantage is that they won't twist while sliding, as conventional O-rings are prone to do. Sealing surfaces are smaller, but the manufacturer believes the pluses outweigh the minuses.

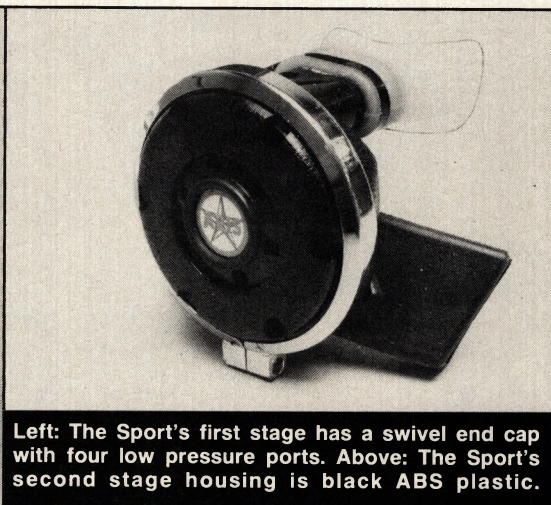
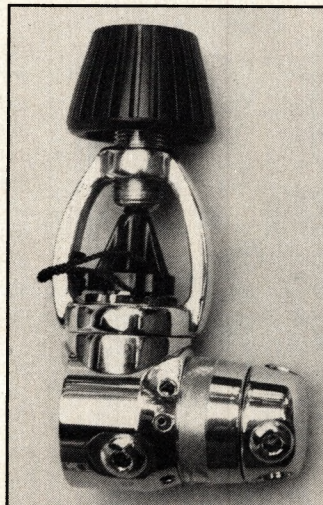
The Sport's second stage follows standard industry design for a downstream, lever action valve. Its housing is constructed from black ABS plastic, which is light in weight but very rugged and resistant to chemicals and petroleum

VANGUARD SPORT

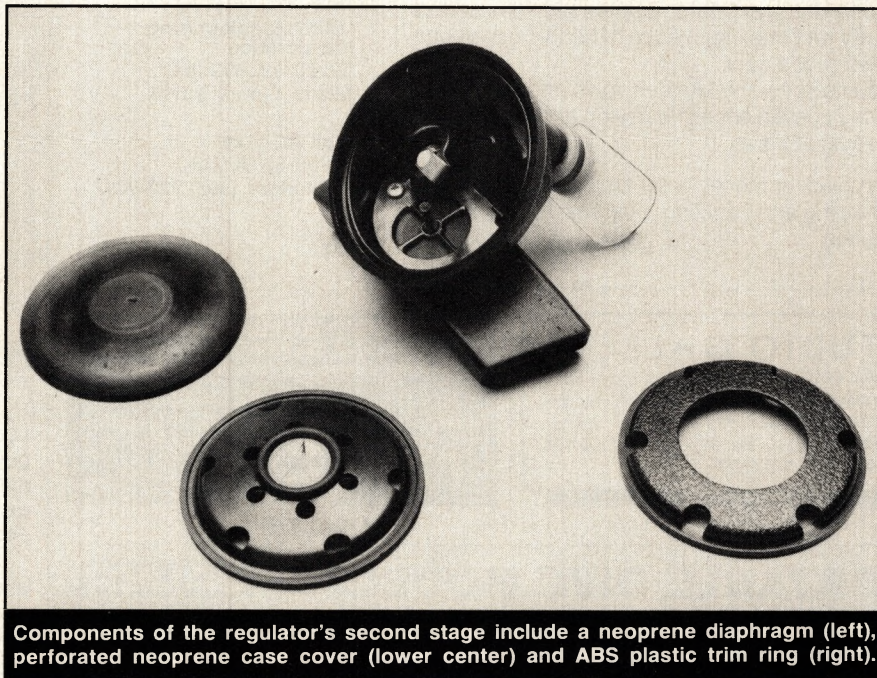
First stage

TypeBalanced piston
Maximum pressure4,000 psi
MaterialsChrome plated brass body
Stainless steel piston and spring
Polypropylene high pressure seat
High pressure ports2, 1/8"
Low pressure ports4, 3/8", on swivel
Intermediate pressure140 psi
Hose length26"
Second stage

TypeDownstream, lever action
MaterialsABS case and trim ring
Neoprene cover, diaphragm, exhaust
valve and tee, poppet
WarrantyTwo years, limited
Price\$260, includes carrying case



Left: The Sport's first stage has a swivel end cap with four low pressure ports. Above: The Sport's second stage housing is black ABS plastic.



Components of the regulator's second stage include a neoprene diaphragm (left), perforated neoprene case cover (lower center) and ABS plastic trim ring (right).

based products. To combine high fashion with economy, the Sport has an ABS trim ring over the neoprene case cover. This ring comes in your choice of black, red, dark blue, orange, yellow, pink or lavender, adding that splash of color that seems to be *de rigueur* in regulators these days.

With its basic design, the Vanguard Sport is user serviceable for simple cleaning. Access to the interior is achieved by removing a chromed brass retaining ring. The diaphragm lies underneath a rubber cap, which is accessed by removing the cover ring. The diaphragm, exhaust valve and tee, and the poppet are all neoprene. Remember, this is an economically priced regulator. For divers who prefer silicone components, the Vanguard Professional offers them in its second stage.

A general problem with many plastic second stage housings has been stress cracking at the point where the downstream valve assembly screws in. U.S. Tech's solution was to beef up the area with more material, then sonically weld a Delrin insert that holds the valve. Delrin has the additional advantage of being self-lubricating, so the lever won't hang up. In addition, the other end of the lever has a Teflon button to reduce friction where it contacts the diaphragm. The original version of the Vanguard Sport was prone to freeflowing, but a stiffer spring has controlled this tendency.


In our test dives, the Vanguard Sport performed surprisingly well in shallow water compared to a high performance regulator. Only in deep water and at low tank pressure did significant differences become apparent.

The Vanguard's only silicone component is the mouthpiece and it has a soft, comfortable, textured feel. In general it

was a well behaved regulator; there were no unpleasant surprises in terms of air or water leaks. When sipping air, cracking effort was high, probably owing to the stiff spring in the second stage valve. It took a bit more effort to keep it going while sipping than the high performance comparison unit. Under high air demand conditions such as hard swimming, there was little difference between the two units at 40 feet. Only when the test was repeated at 100 feet did the comparison regulator assert a clear superiority. At tank pressures below 700 pounds a significant difference was felt as well, even in shallower water. Still, the Sport's airflow was adequate, without any sensation of air starvation.

There was minimal freeflow when the

mouthpiece was removed and it stopped as soon as it was turned down. Clearing was easy in the face up position, but a little residual water was left in the face down, swimming position. The purge button got rid of it all, clearing my sinuses as well as the regulator.

Overall, the Sport performed quite well for an economy model. It should be able to meet the demands of the vast majority of divers and provides a splash of color besides. It comes in a padded plastic carrying case that will also accommodate an octopus and console. With a two year factory warranty, U.S. Tech's Vanguard Sport carries a list price of \$260. The exclusive distributor is Berry Scuba, 6674 Northwest Highway, Chicago, Illinois 60631. 



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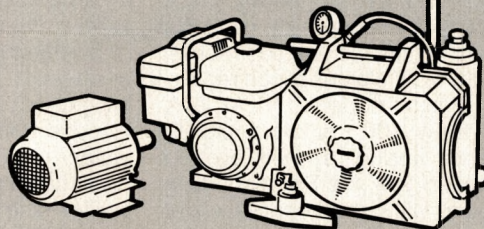
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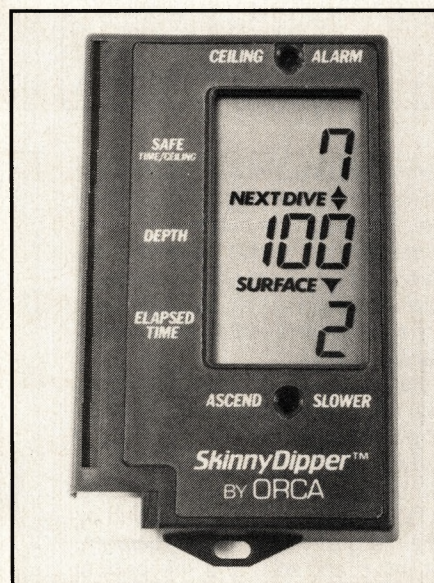
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SKINNYDIPPER

(Continued from Page 61)

mode with a pre-dive planning display of time and depth combinations for the computer's no-decompression limits. Starting at a depth of 30 feet, it will scroll through the depths in 10 foot increments to a maximum of 130 feet. The center row will show the depth and the top row will show maximum time for each corresponding depth. Meanwhile the bottom row will start counting and displaying surface time in minutes.

At the end of the no-decompression scrolling cycle (130 feet), the screen will



During your time on the surface, the SkinnyDipper will continuously monitor nitrogen outgassing and scroll a new set of no-decompression times for the next dive.

alternate to a surface log display. If no dive has been made, the display will be three rows of zeros. After five seconds, the LCD screen will switch back to another cycle of the pre-dive scrolling of no-decompression time limits.

Dive Mode: The SkinnyDipper will remain in surface mode until the diver has descended below six feet. Then a dive mode display will appear. The middle row will show the current depth while the bottom row will show the elapsed dive time. Once a diver has descended below 12 feet, the top row will display remaining time for a safe no-decompression dive.

At 13 feet in the dive mode, the remaining dive time will be displayed by the letters HH, which mean many hours. At 15 feet the HH display will switch to 19H, which means 19 hours of remaining dive time. This number is, of course, theoretical since your air supply would never last that long. As you go deeper, the number of hours will decrease to 3. At somewhere around 32 feet, the remaining dive

(Continued on Page 84)

TRAVEL

WORLD-CLASS CRUISERS

TEXT AND PHOTOGRAPHY
BY CARL ROESSLER

Recently, I spent a week aboard one of the world's greatest new dive cruisers, *Pacific Nomad*, in Fiji. As I enjoyed the features that made this adventure so outstanding, I tried to generalize—to define—just what it is that makes a live-aboard vessel stand out from all others.

My first realization was that to define the great live-aboards, we must first define their clients. When we understand what advanced divers want, we will know that those boats best satisfying those needs are the greatest.

The criteria are fairly consistent among all the divers I've consulted. There are certain key elements a great live-aboard must provide and certain disadvantages it must overcome.

A simple formula can summarize it all: A great live-aboard must offer more and better diving than any shore-based resort—yet it must still offer the comfort, privacy and amenities of a fine resort.

In practical terms, what does that formula require?

1.) First and most crucial is the quality of the diving. To put it simply, the great live-aboards take you to reefs beyond the range of dayboats. They may be 20-300 miles from the nearest resort; that means they don't bear the traffic of hundreds of divers each week. The corals are in better shape and your chances of seeing larger animals are greater.

2.) The second great virtue of the top live-aboards is that once you reach the remote reefs you stay there. Truly unlimited diving is a much-



A great live-aboard must take you to reefs beyond the range of day boats, yet still provide the comfort, privacy and amenities of a fine resort. On-site, it must offer the freedom to dive when you want to. Top: The *Cayman Aggressors* set the standard for world-class cruisers. Above: *Pacific Nomad* is like a mini-cruise ship. Below: The 120 foot, air-conditioned *Tristar* cruises the Philippines.



TRAVEL

abused term some have misinterpreted to mean making four to six dives per day or more. While some avid divers indeed pack in that much diving, the real advantage of a great live-aboard is that you dive whenever you want to!

3.) Finally, the amenities: The greatest live-aboards offer air-conditioned rooms, fine food, nice hot showers, sundecks, fully-stocked bars, comfortable saloons, video and even film processing on board. In other words, the old trade-off of more and better diving from live-aboards instead of the comforts of a hotel has totally changed. Now you can have both, if you select the best of the boats.

Any live-aboard that meets all of these standards has a powerful advantage in cost-effectiveness. Most resort programs still offer only two dives per day; live-aboard divers commonly enjoy up to four because they are anchored over great reefs from breakfast time until bedtime. With all that reef access time, it's easy to do three or four tanks in a day. That means that without even pushing it you can do twice as much diving. If you then compare the cost per dive of your entire vacation (including air fare) you'll find you get much more diving per dollar from a live-aboard. If you want the analysis on this please write to me at the address at the end of this article—I'll send it to you. For many it is a real eye opener.

All right, we now know what makes a superior live-aboard, but which ones are the greatest of this new breed? How can you be sure you are getting the best?

The classic example of the new world-class cruisers has to be the rapidly expanding Aggressor Fleet (*Cayman Aggressor II*, *Cayman Aggressor III* and *Belize Aggressor*, with the *Antillean Aggressor* planned for Curacao/Bonaire in early 1988). This fleet of modern 90-110 foot cruisers has it all—great diving, great amenities and a price that's hard to beat. The *Aggressors* have set the standard for the world; now a number of other vessels are proudly meeting that standard.

In Belize, the newly remodelled *Isla Mia* is winning the hearts of advanced divers every week.

In the Pacific there are at least four claimants to the mantle of greatness:

1.) The fabulous new *Pacific Nomad*



Top: *Sun Tamarin* offers groups of four to six unparalleled comfort and privacy off Palau. Above: The newly remodeled *Isla Mia* lets divers explore the waters of Belize. Below: *Coralita* visits the world's best reefs in the Coral Sea.



offers some of the most exciting underwater photo sites I've ever seen, plus 115 feet of class and comfort. I settled out of the sky on a helicopter and landed right on *Pacific Nomad's* sundeck. Now, that is a dive cruiser. In point of fact, *Pacific Nomad* is much more like a mini-cruise ship. Most exciting of all, the cost of a week aboard *Pacific Nomad* is nearly the same as a week's dive vacation in the Caribbean. That is certainly cost-effective.

2.) At the opposite end of the spectrum, the 60 foot *Sun Tamarin* offers groups of four to six divers unparalleled

comfort and privacy on Palau's reefs and drop-offs. Client letters prove it, this is an all-star adventure.

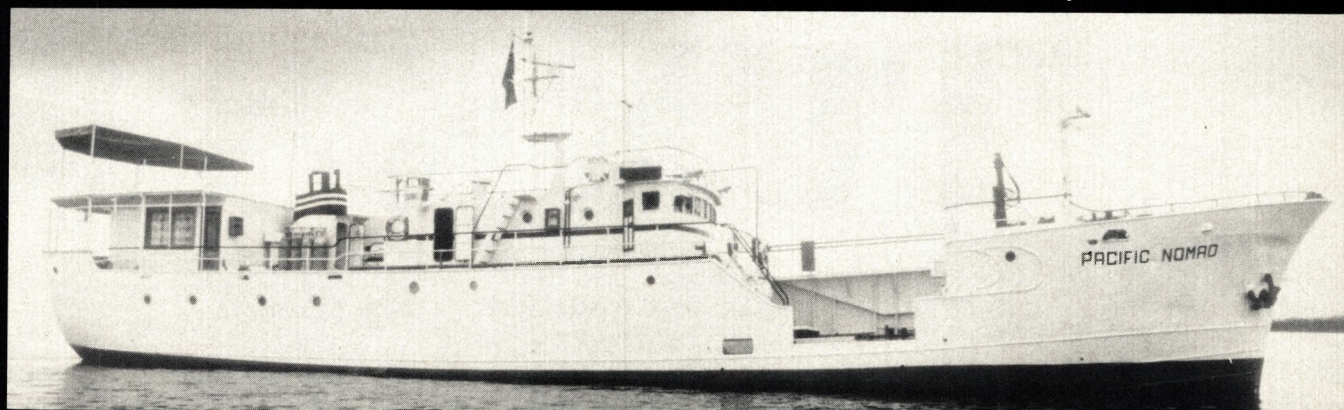
3.) *Coralita* serves Australia's vast Coral Sea. This 79 foot cruiser offers reefs that are still the world's best. Sharks, rays and turtles add a pelagic thrill to your reef dives and visibility can reach 200-300 feet! For 15 years in a row, this has led my list of top diving adventures. You, too, can enjoy it in private air-conditioned double cabins with superb food.

4.) *Tristar*, the 120 foot Philippines cruiser has to be on any all-star list.

(Continued on Page 72)

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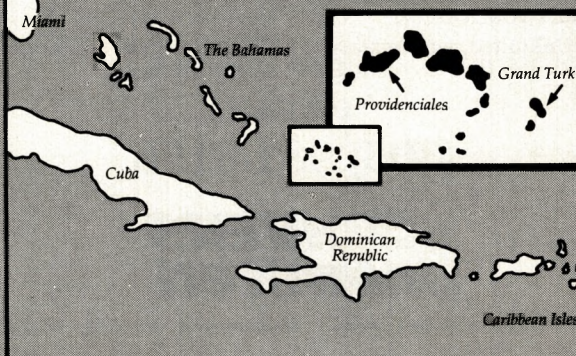
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LIVE-ABOARDS

(Continued from Page 68)

The quality of the diving, the crew of 20 and the air-conditioned cruise-liner ambience combine to make this trip a very rare, exotic treat.

To prepare a select list such as this I have left out some wonderful vessels. *Colona II* and *Colona III* in the Northern Red Sea, *Aurora* in the Sudan, *Elias Mann* in Baja, *Encantada* in the Galapagos, *Coral Star* and *Surfside Explorer* in St. Maarten/Statia, *Thorfinn* in Truk Lagoon and others offer nearly what the greatest offer. Any boat on this list will offer you fantastic underwater adventures. Feel free to contact me or any of the staff at See & Sea Travel, 50 Francisco St., Suite 205, San Francisco, CA 94133 or call (800) DIV-XPRT. In California call (415) 434-3400. We will be happy to help you choose the live-aboard that is best for you. 🐠

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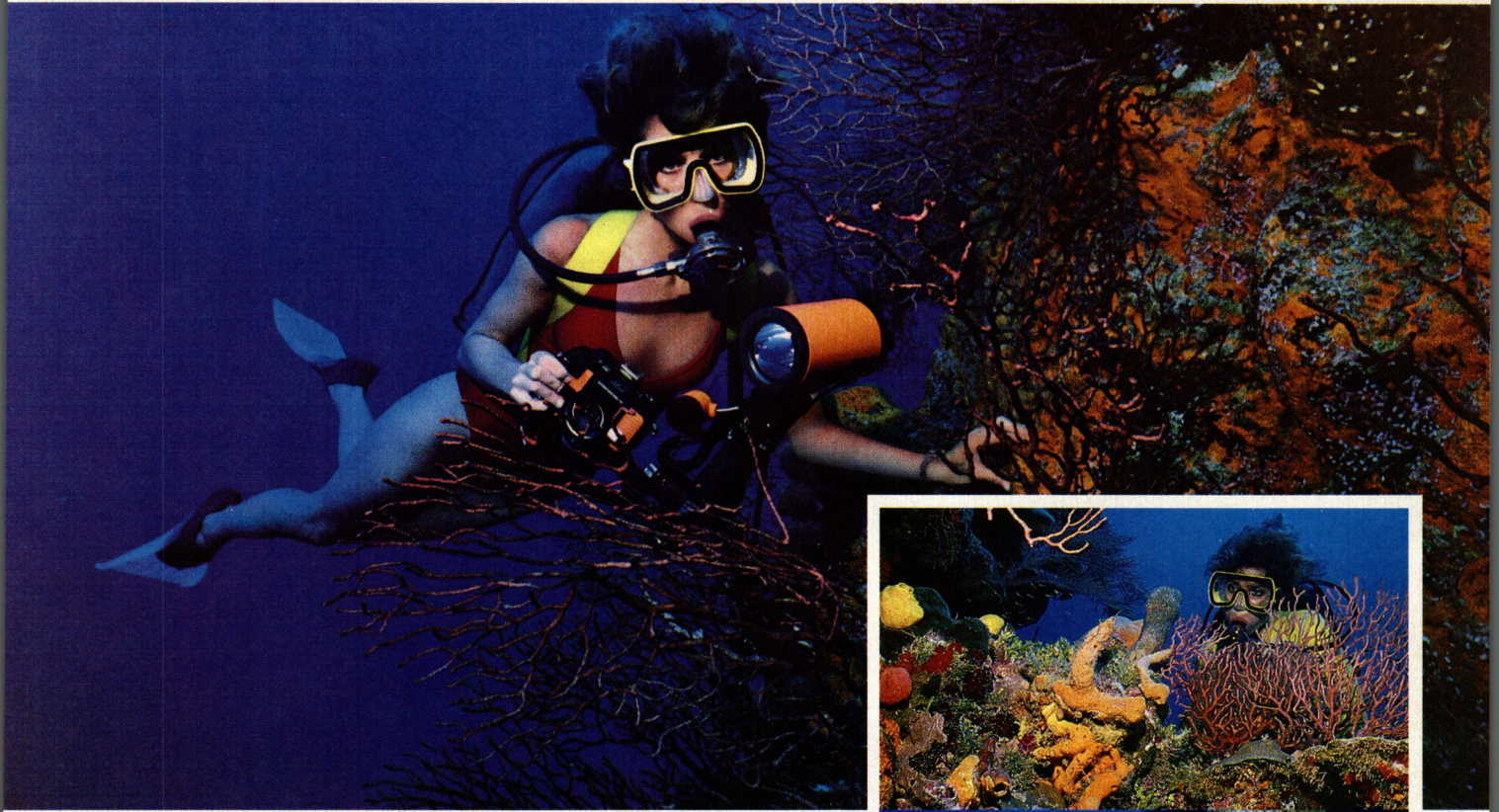
Packages are also available at El Presidente Los Cabos. And, special honeymoon packages are offered at El Presidente Ixtapa.

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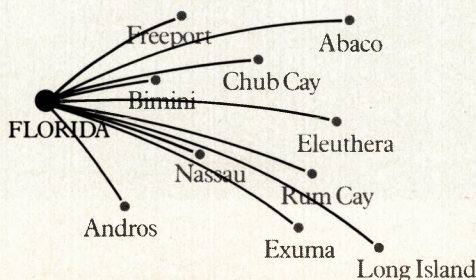
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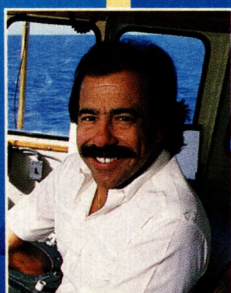


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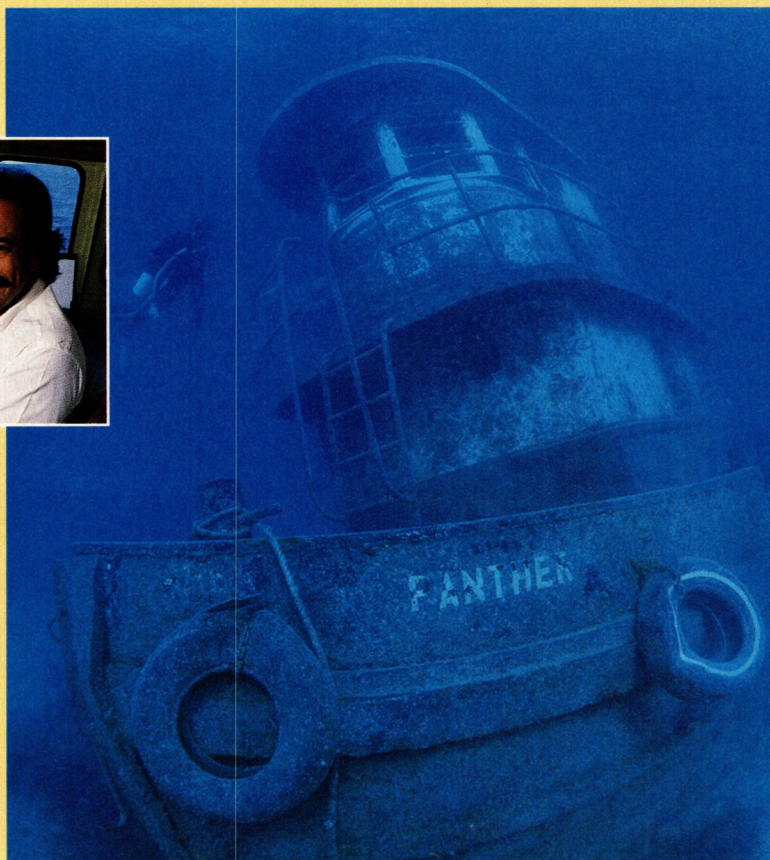
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NINETY FEET OF PURE PLEASURE



Ninety feet long, the *Sea Fever* has a 21 knot top speed that makes crossing from Miami to the Bahamas fast. Above: Tom Guarino videotapes black coral growing on Chub Cay Wall. Inset: Captain Tom Guarino. Right: The *Panther* wreck.



The *Sea Fever* is both a live-aboard dive boat and a state of mind. A 90 foot long by 22 foot beam aluminum vessel, it was originally designed to transport men and supplies to offshore oilrigs in the Gulf of Mexico. Captain Tom Guarino bought the boat and customized it for divers. He realized long before it became fashionable to transform crew boats into dive boats that the comfort, speed, safety and dependability of such vessels made them ideal for overnight cruises.

As a state of mind, the *Sea Fever* is a dedicated dive cruiser. It offers the best available in-water opportunities in areas well explored by Captain Guarino during his 15 years of Bahamas live-aboard experience. This is diving as unlimited as the tables allow. It is night dives and pre-breakfast dives, wall dives along sheer drop-offs with crystalline visibility and underwater excursions to shallow reefs for either scuba or snorkel among healthy, high-profile corals and copious fish populations. It is shore explorations along miles of secluded sandy beaches, windsurfing or water skiing in sheltered coves at sunset and excellent food and service.

This "fevered" state of mind is addictive. At the end of my recent cruise aboard the *Sea Fever*, I knew I'd enjoyed

The *Sea Fever* is a dedicated dive cruiser. It offers the best available in-water opportunities in areas well explored by Captain Guarino during his 15 years of Bahamas live-aboard experience. The vessel has been completely outfitted for diver convenience. Right: Snorkelers take a break on the sandy beach at Alder Cay. Below: Water skiing at Cat Cay. Bottom: Interior of a *Sea Fever* cabin.



Sea Fever

**TEXT AND PHOTOGRAPHY
BY STEPHEN FRINK**



myself, but I was more curious as to how the trip would be critiqued by other guests. Their replies: Paul Theriault, Boston, "Fantastic . . . excellent variety and ease of diving." Jeff Edelnaut, Chicago, "Liked the range of diving . . . food was very good and especially enjoyed the snacks after every dive. Thoroughly enjoyed the underwater video productions." Craig Hewitt, Orlando, "I've been on the *Sea Fever* seven times and all the trips were fabulous." Barry Linden, Wichita, "Definitely better than Kansas . . . food was good and plentiful, equipment was reliable. Things that could have gone wrong didn't and if they had, there were back up systems." Charlie Lord, Orlan-

do, "One of the high points of my diving career . . . live-aboard was a new thrill for me." Darrell Cox, Miami, "My first dive cruise and wouldn't have traded these six days for a weekend with Sophia Loren." Ed and Nancy Post, Orlando, "This is our fifth trip and it just keeps getting better." John Trudell, Orlando, "I've been on the boat for at least 12 cruises, mostly owing to Tom's incredible knowledge of Bahamas dive sites."

The *Sea Fever* is a distillation of the knowledge Captain Guarino has derived in his years of live-aboard dive cruising. The *Annie Up* and the *Sea Fever I* preceded the *Sea Fever* and helped Captain Guarino formulate his plans for his ulti-

mate live-aboard. After he acquired the vessel, much of the interior was stripped and reconfigured to better suit divers. Some of the best features of the boat were retained however, most notably the three, 12 cylinder turbo charged diesels that permit it to cruise at 16 knots, with a 21 knot top speed. Speed was considered an essential so crossing from the home port of Miami Beach Marina to the Bahamas could be accomplished quickly and comfortably and so that the maximum cruising range while in the Bahamas is assured. From a diver's perspective, this also means more diving since the transit time is reduced.

The *Sea Fever* is fully air-conditioned

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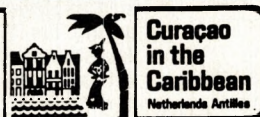
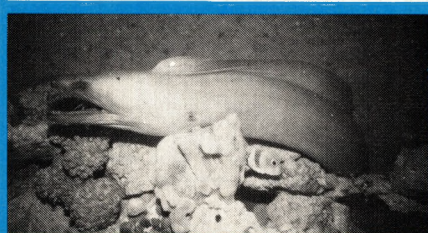
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SEA FEVER

and the efficiency is such that a sweat shirt is recommended even for cruises in the heat of summer. The 24 hour 110 volt 60 cycle electrical service is provided by two 25 kw diesel generators; two continuous duty Mako compressors handle the air fills. The vessel is U.S. Coast Guard/ SOLAS certified and carries dual Loran systems, radar, VHF, single sideband radio and stereo. One of the more popular features of the *Sea Fever* cruise is underwater video.

During each cruise Captain Guarino and the crew use their Hypertech housed video system to tape their guests both above and below the surface to create a master tape of the week's activities. Then, with character and special effects generators and dual VHS editing decks, a custom video is created, available before the boat docks again in Miami Beach. This makes an especially nice memento of one's dive vacation and the nightly review of the day's take is most entertaining. The twin TV monitors are also available to guests who wish to view their own underwater videos. The ship maintains a library of movies and underwater documentaries on cassette as well.

The configuration of the dive deck optimizes convenience and practical traffic flow. There are individual storage lockers beneath the tank racks; long hoses so tanks can be filled between dives without removing backpacks and BCs; fresh and saltwater wash stations for people; and camera rinsing at the dive platform. Aluminum 50, 72 and 80 cubic foot tanks are available on board in a variety of colors to accent the multi-colored dive outfits of so many of the ship's guests. Divers can enter the water either with a giant stride or climb down a wide, sturdy aluminum ladder to the massive dive platform just inches above the waterline. Members of the crew assist divers in both entry and exit and are especially skilled in handling cumbersome camera systems safely. The aft davit has even been brought into use to facilitate the awkwardly heavy underwater three-quarter inch video and 35mm systems brought on board by professional camera crews who have chartered the *Sea Fever* in the past.

Additions to the *Sea Fever* this year include a reverse osmosis watermaker able to produce more fresh water than can reasonably be consumed in a day (1,200 gallons). Perhaps the most exciting new development is the internal reconfiguring of the staterooms to all double occupancy. In the past the *Sea Fever* offered a few doubles, triples, quads and even a six passenger room. However, in

(Continued on Page 80)

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Skin Diver Magazine, 1987



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SKIN DIVER ADVERTISER DIRECTORY

ADVERTISER	PAGE NUMBER	ADVERTISER	PAGE NUMBER	ADVERTISER	PAGE NUMBER	ADVERTISER	PAGE NUMBER
ALM AIRLINES.....	116	COASTAL SCHOOL.....	124	LA MER DIVING/CAYMAN.....	78	SEA FEVER DIVING.....	132
ADORAMA.....	158	COCO VIEW RESORT.....	110	LA MER DIVING/NEW GUINEA.....	78	SEAQUEST.....	6-7
ADVENTURE CONNECTION.....	120	COLLEGE/OCEANEERING.....	36	LA STREGA.....	135	SEA SAFARIS.....	146
ADVENTURE EXPRESS.....	146	COMM'L DIVING INST.....	48	MARK SIEGAL.....	66	SEA SCHOOL.....	156
ADVENTURE EXPRESS.....	78	CONTINENTAL AIRLINES.....	85	NAUI PROF. DIVE CTR.....	83	SEAWARD HOLIDAY.....	129
ADVENTURE EXPRESS.....	78	CONTINENTAL/TWO WORLDS.....	114	NASSAU UNDERSEA ADVENTURES.....	88	SEE & SEA TRAVEL.....	69
AGGRESSOR LTD.....	119	CORAL STAR.....	133	NAUTICA INT'L.....	150	SEE & SEA TRAVEL.....	71
AMERICAN DIVING H.Q.....	148	CURACAO TOURIST BOARD.....	76	NEPTUNO DIVERS.....	141	SEE & SEA TV/BELIZE.....	78
AMERICAN LEISURE.....	85	DARRELL-ALLAN PRODUCTS.....	152	NICK'S AQUA SPORTS.....	105	SHERWOOD SCUBA.....	16
AMERICAN PRO DIVERS.....	132	DELTA BOAT WORKS.....	60	NIKON.....	21	SHERWOOD SCUBA.....	19
ANDROS UNDERSEA ADVENTURES.....	86	DIVE ABACO.....	124	NIKON.....	23	SKIN DIVER WET SUITS.....	160
ANTHONY'S KEY.....	85	DIVE B.V.I.....	145	NORTHWEST DIVERS SUPPLY.....	155	SO. CAROLINA SCUBA SAFARIS.....	150
AQUANAUT WATERSPORTS.....	141	DIVERS ACADEMY.....	152	OCEAN CORPORATION.....	15	SOUTH SEAS CATAMARAN.....	147
AQUA VIDEO.....	137	DIVERS DEN SOUTH.....	116	OCEAN DIVERS/MARINA DEL MAR.....	122	SOUTHERN CROSS CLUB.....	138
AQUA VISION SYSTEMS.....	163	DIVERS INST. TECH.....	61	OCEAN EXPO.....	132	SPARE AIR.....	63
B. FEINMAN SCUBA WORLD.....	139	DIVERS SUPPLY/MACON.....	159	OCEANIC U.S.A.....	C2	SPORT EUROPA.....	41
BAHAMAS TOURISM.....	73	DIVERS UNLIMITED.....	72	OCEAN KAYAK.....	156	SPORTS MERCHANDISER.....	154
BAJA EXPEDITIONS.....	122	DIVERS UNLIMITED.....	118	OCEAN QUEST INT'L.....	142	STANFORD UNIVERSITY PRESS.....	152
BARBADOS TOURISM.....	89	DIVI BAHAMAS.....	109	OCEAN RAY.....	160	STELLA MARIS INN.....	133
BASKIN IN THE SUN.....	82	DIVI BARBADOS.....	117	OLMEVA OF AMERICA.....	48	STUDIO GALLERY.....	66
BAUER COMPRESSORS.....	66	DON FOSTER'S.....	144	OMEGA DIVING.....	108	SUNSET HOUSE.....	123
BAYMAN BAY CLUB.....	103	DREAM TEAM.....	126	OMEGA DIVING.....	70	TLC COMPANY.....	124
BERRY SCUBA.....	162	EREBUS HOTEL.....	71	ON THE RUN.....	160	T III PRODUCTIONS.....	49
BIMINI UNDERSEA ADVENTURES.....	86	FLAMINGO BEACH HTL.....	111	PADI.....	49	TABATA U.S.A.....	C4
BLACKBEARD'S CRUISES.....	148	FONATUR.....	97	PADI INT'L COLLEGE.....	47	TAG-HEUER.....	3
BLACK BART'S AQUATICS.....	156	GALAPAGO INN.....	139	PELICAN TOURS.....	147	TANK TOTE.....	11
BLUE WATER DIVERS.....	71	GINNIE SPRINGS.....	143	PHILIPPINE AIRLINES.....	127	TEKNA.....	9
BOB SOTO'S DIVING.....	94	HWL.....	130	PIONEER.....	154	TEKNA.....	C3
BONAIRE BEACH HOTEL.....	118	HALL'S DIVING CENTER.....	144	PISCES DIVERS.....	149	TIARA BEACH HOTEL.....	115
BONNE AME.....	156	HELIUM LIMITED.....	161	POSADA DEL SOL.....	120	TIME WILL TELL.....	158
BOTTOM TIME.....	145	HOLIDAY INN G. CAYMAN.....	104	POSEIDON VENTURES.....	96	TREASURE ISLAND HTL.....	84
BRAC REEF BEACH RESORT.....	121	HOUSE OF GOLD.....	152	POSEIDON VENTURES.....	105	TRIMARINE BOAT CO.....	130
BRAZILIAN SCUBA.....	78	HYATT HOTELS.....	83	PRO DIVE FLORIDA.....	137	TRIP & TOUR.....	128
BROWNIE'S 3RD LUNG.....	48	HYDROSPACE DIVE SHOP.....	48	PRO DIVE FLORIDA.....	145	TRI-STATE CAMERA.....	156
BUDDY'S DIVE SHOP.....	114	HYPERBARICS INTL.....	124	PYRAMID ISLAND.....	140	TROPIC BIRD.....	151
BUDDY'S DIVE SHOP.....	139	HYPERTECH.....	153	QUEENSLAND TOURIST.....	98-99	TROPIC BIRD.....	151
CSA/BUCCANEER HTL.....	128	IKELITE.....	39	RBM COMPANY.....	55	TROPICAL CONCEPTS.....	138
CAP'N DON'S HABITAT.....	84	IKELITE.....	45	REAL HAWAII.....	153	TURKS & CAICOS.....	70
CAP'N DON'S HABITAT.....	138	INT'L DIVING EXPEDITIONS.....	135	RIDING ROCK INN.....	125	TWO WORLDS/BAHIA.....	134
CAPT. SLATE'S ATLANTIS.....	125	ISLAND PRINCESS.....	71	ROBERT L. STRAIGHT.....	151	UNEXSO.....	80
CARIB INN.....	82	ISLAND PROPERTIES RPT.....	117	SMY.....	33	ULTRA RESEARCH CORP.....	66
CASA DEL MAR/LA CEIBA.....	131	ISLAND REEF HOTEL.....	71	SAM MC COY'S (J-MAR).....	156	UNDERWATER ADVENTURE.....	149
CASA DEL MAR/TWO WORLDS.....	77	J.W. FISHERS.....	154	SAND DOLLAR BEACH CLUB.....	153	V.I. SCUBA/SAIL.....	133
CAYMAN ISLANDER HTL.....	102	JAMAICAN TOURIST BOARD.....	81	SCUBA CONNECTION.....	110	VIRGIN ISLAND SAILING.....	78
CAYMAN ISLANDS TOURISM.....	108	KEENE ENGINEERING.....	60	SCUBA SCHOOLS INT'L.....	37	WALKER'S CAY HOTEL.....	136
CENTRAL SKIN DIVERS.....	157	KENLEE'S ISLAND DREAMS.....	140	SCUBA WORLD.....	150	WENOKA.....	4
CHUB CAY UNDERSEA ADVENTURES.....	88	LA CEIBA BEACH HTL.....	112	SCUBA WORLD.....	158	WEST END DIVING.....	134
CLUB MED.....	143	LA CEIBA HOTEL.....	130	SCUBA WORLD.....	70	WHITE'S ELECTRONICS.....	148
CME VIDEO.....	152	LAHAINA DIVERS.....	149	SEA DANCER LIVE-ABOARD.....	113	WIMP DIVER.....	124
		LA MER DIVING/EXOTIC.....	78	SEA FANS VIDEO MAGAZINE.....	35	WINDWARD/AARONS.....	141

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SEA FEVER

(Continued from Page 77)

an effort to increase the comfort and privacy of their guests, the double occupancy rooms were installed. Some of the cabins have both a twin bunk and a single, while others are equipped with two singles. The normal complement of divers is 16 in eight double staterooms, but up to 23 people can be accommodated.

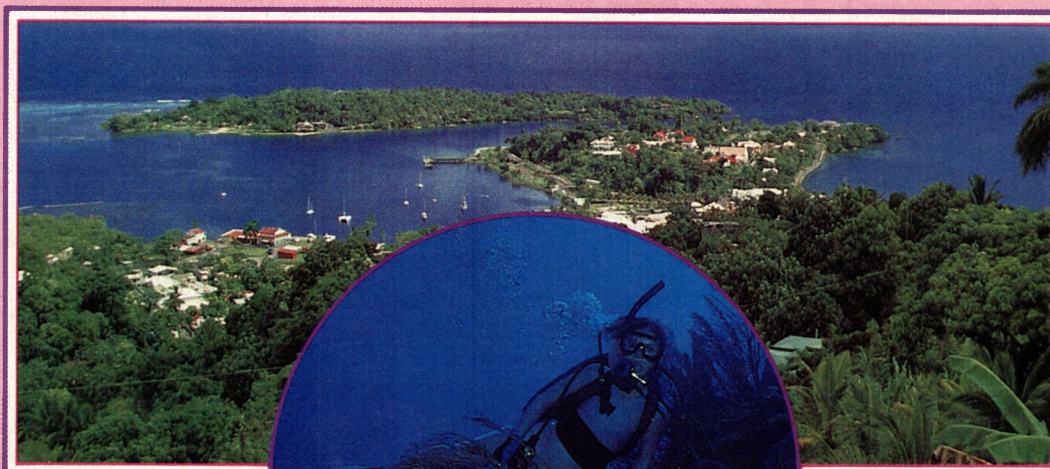
The itinerary of a *Sea Fever* cruise is variable, but generally includes Andros, the Berry Islands, Cay Sal or the Bimini/Cat Cay chain of islands. All of these are accessible from the ship's Miami Beach point of departure (15 minutes and a \$12 cab ride from Miami International Airport). The general format of the cruise is from five to seven days in length, depending upon the itinerary booked. Taking the Cat Cay/Western Bahamas excursion as an example, a guest would arrive at the boat by 9:00 am on the day of departure and by noon the *Sea Fever* would have cleared customs at Cat Cay and the dive vacation begins. The cruising range would likely be from Bimini in the north to Riding Rock Cay (25 miles south of Cat Cay) in the south. This encompasses a tremendous amount of pristine, untrammelled reef and the wild underwater chance encounters that make live-aboards so popular these days.

A dive at Victory Reef or Tuna Alley provides a fascinating introduction to the underwater delights in store. Here visibility is likely to be in excess of 100 feet. Within the 25 to 75 foot drop-off at the Victories, pelagics will swim by and beautiful tropical fish will infiltrate the high corals and vase sponges along the reef face. This area is perhaps best known for its caverns and vibrant colors. Tuna Alley is better known for the late spring/early summer annual migration of the giant blue fin tuna (300-1,000 pounds). This spectacular 45 to 90 foot mini-wall is adorned with tube and encrusting sponges, black corals and is typically populated by schooling jacks, eagle rays, turtles, large groupers and, occasionally, blacktip sharks.

The wall at Cat Cay is one of my favorite Bahamas drop-offs. It can start as shallow as 70 feet and is absolutely jammed with sponges and whip corals of every imaginable hue. In the lee of the prevailing winds, this wall is typically blessed with excellent visibility and offers stunning wide angle photographic potential. Other dives I have especially enjoyed on this particular cruise include the famous ferrocement shipwreck of the *Sapona* with its tremendous populations of schooling fish and the *Panther*, an upright 65 foot tugboat intentionally sunk in only 45 feet of water.

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SEA FEVER

often requested, areas on the *Sea Fever* cruising schedule is the Berry Islands chain. The major attractions here are the sheer drop-offs along the Tongue of the Ocean and the exciting marine life that tends to congregate where this indigo abyss meets the shallows of the Great Bahama Bank. Tidal shifts along the banks continually wash nutrients over the wall face, nourishing the colorful sponges, deep water gorgonians and black corals that so magnificently decorate the plunging precipice. A typical wall dive along the Tongue of the Ocean in the Chub Cay area, for example, will begin in 70 to 90 feet of water and drop vertically to 6,000 feet. Black corals, orange elephant ear and tube sponges, barracudas, angelfish, groupers and eagle rays are virtually guaranteed. Chance encounters might include blacktip or hammerhead sharks, turtles, tuna or even a manta ray. On our last trip two of the guests had the opportunity to videotape at least ten minutes of mating turtles. While I was disappointed to miss the still shot, it was still exciting evening viewing on the ship-board monitors.

As the *Sea Fever* cruise proceeds farther north in the Berrys there are some truly beautiful small islands with picturesque palm-lined white sand beaches. These are superb for snorkeling, lounging on the beach or just getting away for a few hours. Alder Cay was one such island we especially enjoyed for the above water photo potential. Just an hour or so farther north brought us to one of the most impressive stands of absolutely intact elkhorn corals I've seen anywhere in the Caribbean.

The Cay Sal itinerary offers even more wall diving and the exciting addition of at least five oceanic blue holes to explore. You can even enter a submarine cavern and ascend through a pool on an island. Magnificent shallow reefs of elkhorn and staghorn corals are inspiring counterparts to the deep dives of each itinerary. Since the ideal is to provide as much diving as a guest might desire, the *Sea Fever* generally anchors in these shallow spots in the afternoon so as to extend bottom time and be in place for a productive night dive. Quality, quantity and variety in dive options seem to typify the *Sea Fever* charter, no matter which of the itineraries is booked.

Sea Fever ads proclaim, "There's a fever in the Bahamas . . . catch it now!" I've caught it several times over the past few years and I thoroughly recommend it. For further information or reservations contact the *Sea Fever* at P.O. Box 39-8276, Miami Beach, Florida 33139 or phone (800) 44-FEVER or (305) 531-DIVE in Florida.

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SKINNYDIPPER

(Continued from Page 66)

time display will switch from 3H to 196, which stands for total minutes. From this point downward the remaining safe dive time will be displayed in minutes only.

While the pre-dive planning display is limited to a depth of 130 feet—the traditional limit for sport diving—the SkinnyDipper will actually function to a maximum depth of 199 feet. During descent it will continue to count and display elapsed dive time while showing increasing depth (middle row) and decreasing dive time remaining (top row). If you made a rapid descent to 199 feet the display would show two to three minutes remaining dive time. SkinnyDipper users are cautioned to stay within the recommended 130 feet for safe no-decompression dives.

During ascent, the SkinnyDipper monitors your rate of ascent as well as the current diving depth. This computer has three different rates of ascent for specific depth zones. They are as follows:

DEPTH	MAXIMUM ALLOWED ASCENT RATE
0-60'	20 ft. per minute
61-120'	40 ft. per minute
121-199'	60 ft. per minute

If a diver exceeds the maximum allowable ascent rate the red LED indicator will come on below the screen and the depth display will begin flashing. The diver must then stop and wait for the computer to catch up or drop down a few feet to shorten the catch-up time.

At first, this new ascent rate procedure may be a bit frustrating since most divers are not used to slowing their ascent rate as they get nearer the surface. It takes some practice to become skillful at controlling ascent rate, especially when it must be slowed to 20 feet per minute. This amounts to a full three minutes between 60 feet and the surface. With practice this becomes easy, because the diver now has an accurate rate of ascent monitor—the SkinnyDipper.

Another interesting aspect of the SkinnyDipper is that remaining safe dive time will begin to increase as the diver gets shallower. This is a function of Orca's special multilevel decompression calculations. The diver is credited additional time for moving shallower and thus the total remaining dive time may be a lot longer than anticipated.

Surface Mode: The SkinnyDipper will remain in dive mode until the diver ascends above four feet. At this point, the screen will switch to surface mode, showing two different displays that alternate every 15 seconds.

The first surface mode display is the

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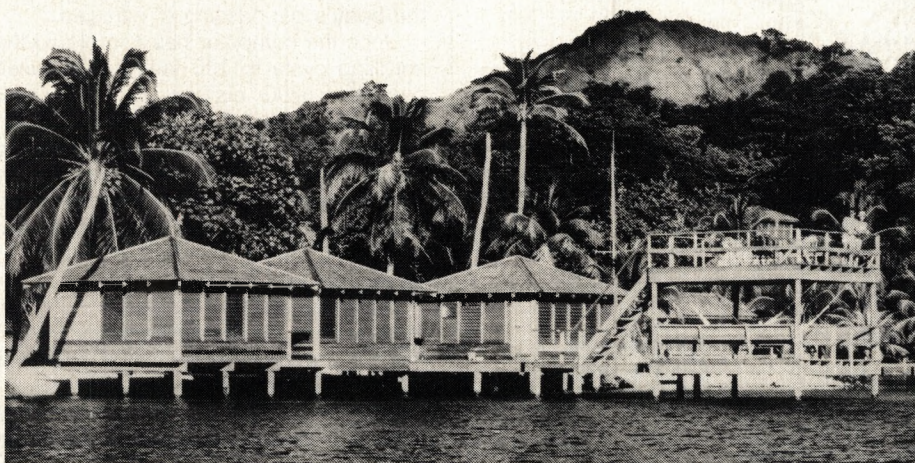
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SKINNYDIPPER

pre-dive scrolling of no-decompression limits—for the next dive. Time limits for various depths will be noticeably shorter since a dive has just ended and the diver has accumulated residual nitrogen.

While the no-decompression limits are scrolling, the SkinnyDipper is counting and displaying elapsed surface time. As the surface time increases, so will the no-decompression time limits for the next dive. The computer is really calculating the body's out-gassing of nitrogen.

Once the computer has completed the scrolling cycle to 130 feet, it will switch over to a LOG display. This will show maximum depth for the last dive and total dive time. It will also display the required amount of surface time before you can fly in a commercial aircraft. Orca defines a commercial aircraft as one that provides a passenger cabin pressure equivalent to an altitude of 8,000 feet or less.

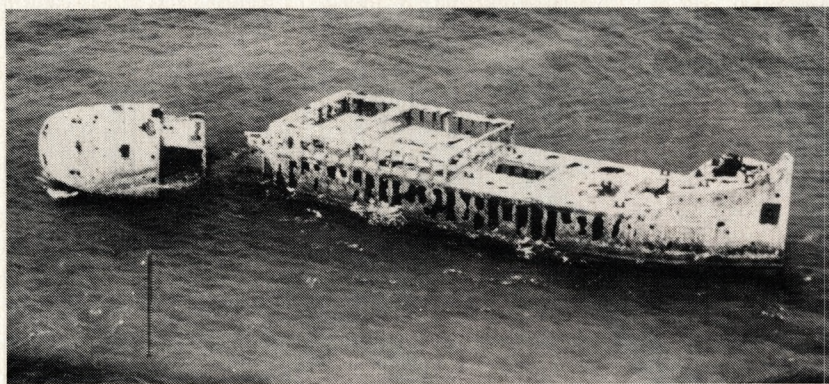
Decompression Mode: Should the diver exceed the no-decompression limit while in the dive mode the SkinnyDipper will immediately switch to Decompression Mode and the screen will change to decompression display. The first thing that happens is the decompression alarm starts flashing red. This alarm is not easy to ignore, especially in the dim light of deeper depths.

The normal dive mode display has now been replaced with a new display that includes the word CEILING at the top of the screen. Next to it is a small arrow pointing down to the number in the top display row. This number no longer represents remaining safe dive time, it now indicates the shallowest depth at which a decompression stop should be made. Unlike the U.S. Navy decompression stops, which are in 10 foot increments, the SkinnyDipper will calculate an exact depth at which a stop should be made. It could be a 7, 12 or 16.

The decompression display will alternate with another display that simply states "go up." In case the diver has forgotten what the flashing warning indicator means, the computer tells you precisely what corrective action to take.

As the diver begins to ascend, care should be taken not to exceed the maximum ascent rate prescribed by the computer. Should this happen, the diver will be staring at two red warning indicator lights and a very displeased computer.

If corrective action is taken at the first sign of decompression mode, it is possible for the diver to eliminate the excess nitrogen build-up and revert back to the no-decompression mode. For example, if a diver makes a no-decompression dive to 130 feet, the maximum allowable time is 9 minutes. Should the diver overstay for a total of 12 minutes the SkinnyDipper



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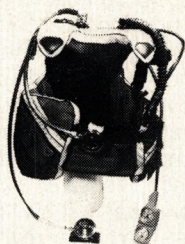
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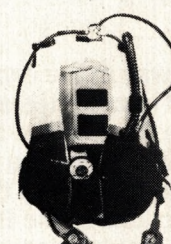
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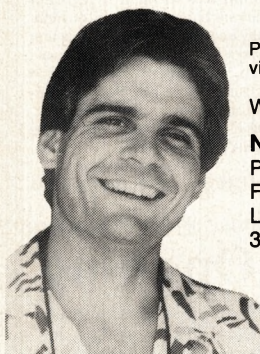
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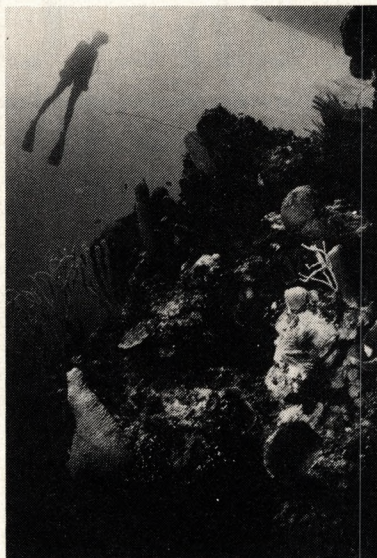
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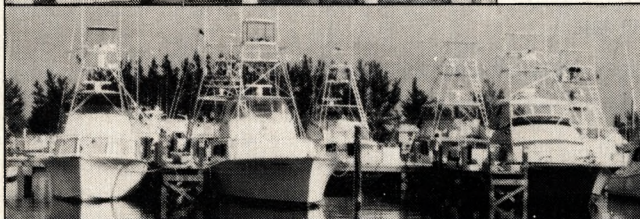
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SKINNYDIPPER

will advise a ceiling depth of 10 feet and urge immediate ascent. If the diver begins ascending at the 12 minute mark and remains within the allowable ascent rate, he or she should be able to get out of the decompression mode at 38 feet.

Out Of Range Mode: Since the SkinnyDipper is specifically designed as a no-decompression dive computer for sport divers, it has limitations. One of these is depth. There are no displays for deeper than 199 feet. Once the diver exceeds this depth, the computer will switch into out of range mode. The center row of the new screen will show the letters "or," which signal this depth out of range.

As the diver begins ascent above 199 feet, the depth display will return but it will continue to alternate with "or." The "or" will continue to alternate in the display during the remainder of the ascent and even into the decompression period. This is to indicate the diver has gone beyond the tracking abilities of the computer and that the recommended decompression schedule of times and depths is unreliable. The diver should decompress for a much longer period than indicated on the display. Even after surfacing, "or" will continue to show up in surface mode when the log display is shown. It will haunt you until the unit is turned off.

Error Mode: If a diver jumps into the water with the SkinnyDipper turned off and switches it on underwater, the computer will display three rows of EE, symbolizing an error has been made. Do not attempt to use the computer in error mode; instead, surface and use the correct procedure for powering it up.

DIFFERENCES FROM USN TABLES

The decompression tables for Orca's SkinnyDipper and Edge are different than the U.S. Navy no-decompression tables. Time limits at specific depths are 10 to 30 percent shorter. Maximum ascent rates are the same at deep depths, but 33 to 66 percent slower shallower.

With the USN tables there is one standard ascent rate of 60 feet per minute. With the SkinnyDipper the 60 feet per minute ascent rate is fine for the 121 to 199 foot zone. However, from 61 to 121 feet this rate is slowed to 40 feet per minute. And, from 60 feet to the surface, the rate is only 20 feet per minute. This slowing of ascent rate as you get nearer to the surface helps avoid the possible formation of micro bubbles.

According to the manufacturer, the Orca Decompression Model has been demonstrated to be much safer than the U.S. Navy tables. Edge divers using the same Decompression Model have made

(Continued on Page 104)

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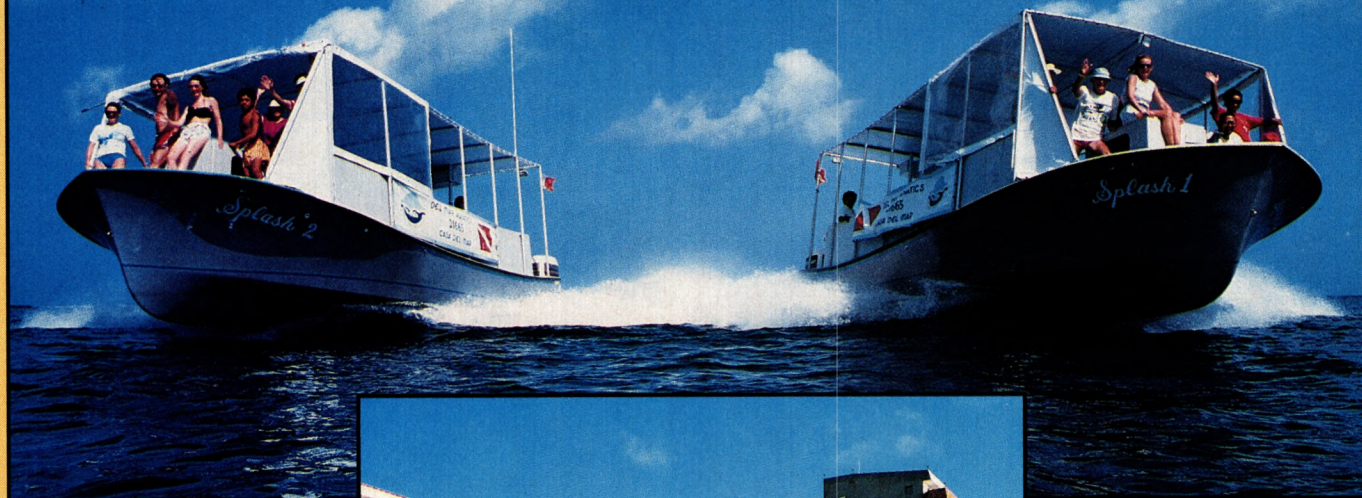
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BARBADOS 

Del Mar Aquatics at



As the last passengers took their seats, the airline's gate representative spoke through the intercom, "We'd like to once again thank you for choosing Continental's nonstop jet service to Cozumel, Mexico. The ground crew thought you'd like to know that, unlike our stormy weather here in Houston today, Cozumel is sunny and warm; and, yes, we're jealous. Have a great time in Cozumel!" For the duration of the brief trip, laughter dominated the cabin.

Cozumel, as any Texas diver can attest, has become a true diving mecca. The reef names of Palancar, Santa Rosa and Colombia have gained world renown and rightfully so. Warm waters funnel through the 13 mile corridor that separates Cozumel from the Yucatan Peninsula. The fertile currents have nurtured an amazing coral reef system. Riding with the flow lets divers sail past gorgeous coral pinnacles and ridges. The density of colorful marine life is breathtaking. Until now Texas divers have been able to keep the island mostly to themselves, but no longer. Cozumel's reputation has spread. After all, when an island has such extraordinary reefs, superb resorts and friendly people, it is hard, even for Texans, to keep the secret. The team of La Ceiba



COZUMEL'S LA CEIBA HOTEL

TEXT AND PHOTOGRAPHY BY MARK M. LAWRENCE



La Ceiba Hotel and Del Mar Aquatics offer guests excellent service. From top: Del Mar Aquatics' fast boats, *Splash 1* and *Splash 2*; La Ceiba Hotel; divers make an easy entry.

ba Hotel and Del Mar Aquatics exemplifies this special world of Cozumel. Here the staff goes out of its way to make you comfortable.

The modern La Ceiba Hotel, constructed in 1977, stands on the southeastern shore of Cozumel. It's the closest resort to the dive sites. Although half of the 115 rooms are in the northern wing, the 12 story tower has become synonymous with La Ceiba's image. No matter where your room is you will find comfortable accommodations that include a refrigerator stocked with a delightful assortment of beverages and snacks. Should you tire of the view from your balcony, you can switch on the cable TV. Although the rooms are already fully air-conditioned, the management is currently installing ceiling fans in all of them.

The resort's waterfront reaches across the entire length of the property. To reduce the boat traffic and improve the safety of the immediate dive sites, the hotel built two piers and buoyed off the principal swimming areas. Dive boats utilize the northern dock. The stretch from the second dock to the sheltered beach entry at the southern end of the resort's grounds is for the exclusive use of divers and snorkelers. Within this



A patch reef and airplane wreck are just offshore La Ceiba in waters where boat travel is prohibited. Clockwise from above: La Ceiba's hot tub, pool and swim dock; a corner room in La Ceiba's tower; Cozumel diver silhouette; Terri Dethloff herds starfish at Santa Rosa Reef; Continental Airlines offers nonstop service to Cozumel.



marked area, the patch reef and the airplane wreck make for a great first warm up dive of the trip, an afternoon beach dive or an entertaining night dive. Convenient rinse stations stand at the base of each pier.

You can tell the hotel management is tuned into vacationing divers' desires. Currently under construction at the foot of the boat dock are 150 individually locked storage bins that La Ceiba Hotel general manager Juan Mude-spacher refers to as the "divers' safe deposit boxes." Throat a little dry after that last beach dive? How about some fresh fruit juice or a cold Te-cate. You will find the Beach

Bar beneath the same thatched roof as the swim area's rinse tank. In case you missed the freshwater shower by the boat dock there is another one by the pool and if you missed that, well then there's the pool; the hotel staff is very understanding. By late afternoon you can usually find a happy crowd in the 10 by 21 foot hot tub. If you have finished your drink by now, don't worry, the bartender at the end of the spa will hand you another one. Rough, eh?

For those who have had enough of the water, La Ceiba offers plenty of topside distractions. The energetic can enjoy the tennis court while the

rest of us appreciate the scores of chaise lounges on the sand. In the shops adjoining the hotel you can pick up toiletries and notions, tropical clothing or local handicrafts. The photo shop rents a variety of underwater cameras and processes film. It delivers 1,000 quality color prints each hour! In addition to C-41 the lab runs E-6; frequent checks by the calibrated densitometer of their two Jobo processors' work ensure that your slides come out true. From the same arcade you can rent a car or motor scooter. At the end of the day, the hotel has yet another pleasant surprise for you. After a massage you can

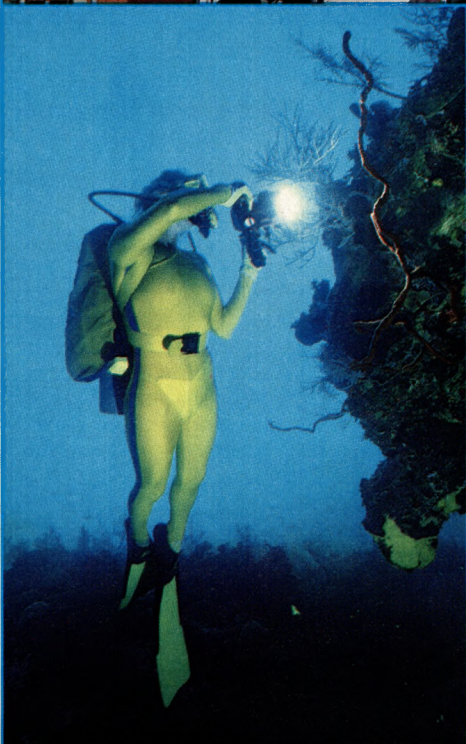
watch the sunset through the large insulated windows of the hotel's sauna.

Indulge yourself even more at one of the hotel's two restaurants. During the day the outdoor restaurant and bar by the beach, Chopi Loca, offers a variety of entrees, sandwiches and snacks. If gazpacho soup or shrimp cocktail doesn't appeal to you, maybe the guacamole dip or *nachos* will. Inside the main dining room, the Galleon, the chefs produce full breakfasts and wonderful dinners. Try the fresh catch of the day or fillet Yucatan. Meat lovers should sample the New York cut or pork tenderloin. The Lafitte bar

(Continued on Page 102)

BRAC AQUATICS

AT BRAC REEF BEACH RESORT



From top: Divers on the wall at Little Cayman; Brac Reef Beach Resort; the McDermots inside the Brac Aquatics headquarters; Eleanor Klein off Little Cayman; Brac Reef room interior.

Cayman Brac has a distinctive air. Life here is a little slower, a little quieter. Some of the residents claim the casual mood is reminiscent of the Caribbean atmosphere 20 years ago. Cayman Brac is not a remote dive destination; in fact, Cayman Airways' Shorts 330 flies between Grand Cayman and Cayman Brac several times each day and its 727 flights, which originate in Houston and Miami, regularly extend their routes to include the 15 minute commute to the Brac. It is by conscious choice that Cayman Brac has changed so little. The Brac Reef Beach Resort and Winston McDermot's Brac Aquatics, Ltd. have managed to preserve this unpretentious Caribbean ambiance and still maintain high service standards. Combine these operations with the outstanding reefs surrounding Cayman Brac and nearby Little Cayman and you have the ideal setting for a great diving vacation.

While both the Brac Reef Beach Resort and Winston McDermot's Brac Aquatics, Ltd. have new facilities, both still belong to the same islanders who founded these growing businesses more than a decade ago. By building a whole new resort, Linton Tibbetts capitalized on his past experience in catering to divers. The hands-on

style of his resident managers, Joe and Jane Capretta, evolved from their years of managing other successful resorts. All of the 40 air-conditioned rooms face the sea. Ceiling fans, light wood and pastel colored furnishings set a tropical motif. Sandy ridges covered with various flowering shrubs and stands of sea grape trees accent the property. Close to the rooms, the freshwater pool and spa invite an after dive splash. At the eastern end of the pool, the Channel Lounge serves beverages indoors and out. Umbrellas shade the nearby tables and chairs. As you walk down the wooden path to the Conch Shell Pier Bar from the Channel Lounge, you pass the volleyball net, the

you forgot an article of clothing or just want to add to your wardrobe, Island Girl, also in the lobby area, has a wide selection of beach and resort wear. The boutique also carries jewelry made from black coral and the local semiprecious stone, Caymanite. The hotel can help arrange an island tour of the bluffs and caves. Head over to the dive shop if you want to rent bicycles or mopeds.

Next to the resort are the main dock, the divers' locked gear storage hut, Winston McDermot's Brac Aquatics and Ed Beatty's Brac Photographics. Looking around Ed Beatty's shop tells you a great deal about him. On the end of the light table is a small mountain of old SKIN DIV-

groups such as Skinny's Scuba from Birmingham, Alabama coming back year after year, the divemasters have to work hard to not only please the guests but also come up with new locations for such repeat visitors to explore.

Excellent service and personal attention are major reasons individuals and groups keep returning to Winston McDermot's Brac Aquatics. On the first morning of your trip, leave your gear bag by the front lobby. The staff will pick up your equipment, deliver it to the boat, assemble it for each dive and return it to the divers' storage building. You will never have to carry your gear! Their pampering extends even to dive site selection. For ex-



Guests under umbrellas near the Channel Lounge. Cayman Airways jets reach Grand Cayman and Shorts 330s connect to the Brac.

main sea grape grove with its barbecue grills and octagonal picnic tables, one-half dozen hammocks hanging in the shade and the white sandy beach. In the calm water, sheltered by an offshore barrier reef, you can cruise about in colorful paddleboats. At night, you might watch the tarpon feed below the lights on the end of the pier; sit in one of the swinging love seats and listen to the sounds of the waves on the reef; or, perhaps, walk along the deserted beach. Many people gather in the Channel Lounge to share dive stories and laughter. On the lounge's TV you can see a cable station movie or sporting event and guests sometimes bring videotapes of the day's dives to watch. Next to the bar is the dining room.

Dinners, like all meals, are served buffet style. Entrées range from prime rib to fresh baked or grilled fish. As with lunches, dinner buffets usually include a variety of pasta, bean or garden salads, fresh vegetables and a choice of desserts. Most lunches, weather permitting, are served outside under the sea grape trees. It doesn't take long for the aroma of grilled hamburgers and hot dogs to lure a crowd of divers just in from the morning trip.

You can pick up snacks and notions from the shops in the hotel lobby. In case

ER Magazines. On top of the counter's slide viewing panel are sheets of original underwater slides for sale. The store shelves contain boxes of film and an assortment of photographic equipment. His diploma from the Brooks Institute School of Photography hangs unobtrusively in the corner. Whether you just purchased your first Nikonos or second 15mm lens, Ed is obviously qualified to help you get the most from your equipment. In addition to teaching, Ed also shoots video and stills of guests U/W, offers overnight E-6 film processing and maintains a full rental line of photographic and video gear.

Winston McDermot's Brac Aquatics, Ltd. connects with the photo shop. You can rent everything from a pair of fins to a complete regulator and octopus rig with pressure/depth console. If you prefer, you can take advantage of the complete retail inventory and purchase a new scuba system. As you might expect, the staff at Brac Aquatics handles a variety of introductory scuba, referrals and specialty courses. Part of what makes Brac Aquatics special is its seasoned staff. Cornell Burke and Gregory Ebanks have been with the company since opening day. Such an extensive background means the crews have a truly intimate knowledge of the area's dive sites. To keep

ample, Cornell's briefings on the morning two tank boat trips include a review of the possible dive locations and features. He then allows the divers to choose the site and profile they like best. Guests also determine which group they wish to join. This system encourages all divers, veterans as well as novices, to comfortably dive within their level of experience.

Diving from the Brac Aquatics boats is easy. All three were designed by Winston specifically for the local conditions. The three primary vessels, the 55 foot *Reef Runner*, the 45 foot *Pumpkin Baby* and the 32 foot *Cat Limbo* are all diesel powered. They normally carry 25, 20 and 12 divers respectively. The largest craft, the *Reef Runner*, typifies McDermot's design philosophy. *Reef Runner* is a beamy 17 feet. The wide and open layout leaves the passengers lots of room for moving about. Gear bags fit under the benches along the sides of the hull. With the tanks, equipment and small control room mounted low in the hull, the craft is exceptionally stable. Even if the trade winds get a little strong and the seas kick up a bit, the *Reef Runner* makes diving comfortable. Attached to the wide stern platform, the swim ladder makes exiting a breeze. All the boats carry first aid kits, oxygen and VHF radios.

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p/p dbl.

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Quad p/p

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\$222

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Quad p/p

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The American Express® Card warmly welcomed at Bob Soto's Diving Ltd.
Does not include tax & gratuity payable upon arrival

BRAC REEF

Surrounding the Brac are dramatic walls. One of the better known sites is Anchor Wall. In 60 feet of water, the reef crests and plunges into the deep. As is typical of the southern side of the Brac, many crevices dissect the wall. At exactly 100 feet, an enormous anchor clothed in a veneer of encrusting corals and sponges protrudes from the wall.

At Hole in the Wall you swim across the sand at 60 feet to a coral ridge that rises to 45 feet. Instead of traveling over the reef, guides lead groups through one of the winding tunnels to emerge on the middle of the southern wall.

While diving on the north side's Airport Wall you will see basket sponges that grow almost six feet tall! When you return to the top around 55 feet, don't be surprised if a curious Nassau grouper comes around looking for handouts.

The name East Chute aptly describes a large canyon that spills down the northern wall from 60 to around 130 feet. Schools of fish cling to the sides. Look for an anchor at 90 feet. Groups of eagle or southern stingrays frequently cross the reef here.

Winston's boats normally head over to Little Cayman—weather permitting—at least three times per week. Be forewarned that diving Bloody Bay and Jackson Bight are addictive. The warm, ultra-marine water stimulates the spectacular growth of layer upon layer of corals and sponges. Pointing your light onto a black sponge transforms it to vibrant carmine; illuminate a mustard basket to make it a brilliant yellow. Coral heads on shallow reefs, such as The Meadows, reach up from the floor to within a few feet of the surface. Nassau and tiger groupers, yellowtail snappers and juvenile horse-eye jacks have learned that in these marine park reefs they are safe; they'll escort you throughout your dive.

In response to the demand for a live-aboard vessel to stay exclusively at Little Cayman, Winston McDermot designed and built the 16 passenger, 65 foot *Little Cayman Diver*. Each double occupancy stateroom has its own wash basin and medicine cabinet as well as a private entrance to a head and shower. Although the entire craft is fully air-conditioned, Winston installed two portholes in each cabin for optional natural ventilation. This boat has all the latest toys: TV, VCR, compact disc and stereo cassette players. Photographers will like the huge working table in the staging area, battery charging station and the presence of Capt. Bob Bowdy who, it's rumored, has worked miracles with cranky camera gear. There is always someone on duty at the 6 by 17 foot dive platform to help guests in and out of the water. As on all

Diving News From Down Under

New Dive Boat At Hayman

TEXT AND PHOTOGRAPHY BY GERI MURPHY

Hayman Island, Australia's Great Barrier Reef resort, has just announced the completion and launching of the *Reef Goddess*. It has been touted as the most luxurious dive boat to cruise the waters of the Great Barrier Reef.

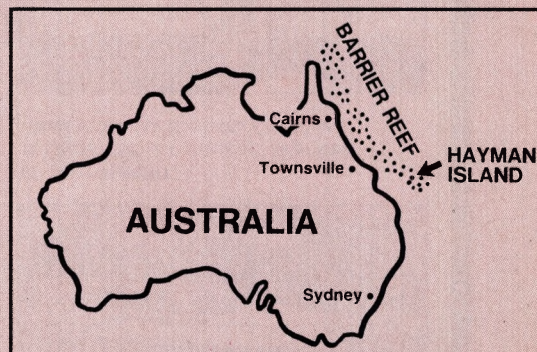
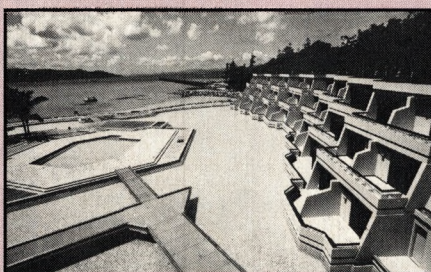
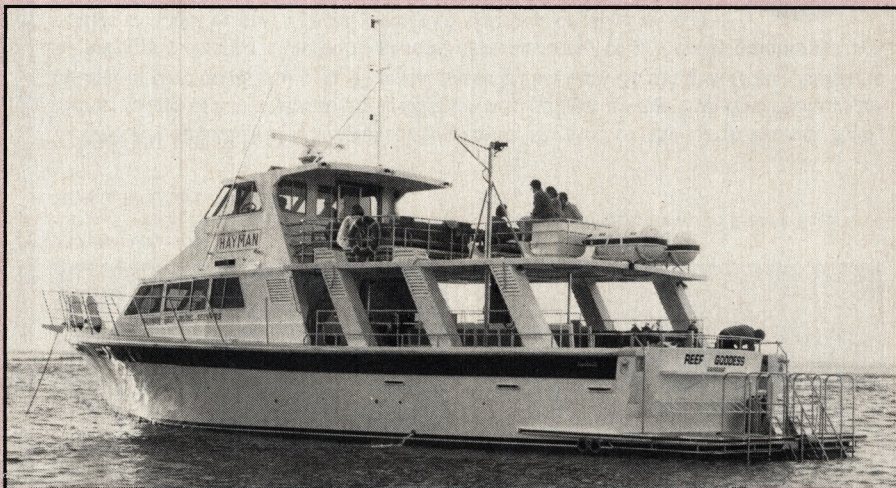
Built at a cost of \$200 million, the new Hayman Island resort is being heralded as the eighth Wonder of the World and is certainly the most unusual hotel in Australia. Its unique tiered guest accommodations and expansive lagoon pool stand as magnificent architectural phenomena.

It is only fitting that Australia's finest island resort would feature snorkeling and scuba diving as one of its main attractions. In keeping with the stylish flare of the hotel, Hayman Island has built a 60 foot twin diesel 1,500 hp craft that can carry up to 24 divers and cruise at 22 knots. The *Reef Goddess* was built by Precision Marina, one of western Australia's most prestigious boat builders.

The dive deck has a streamlined design with individual gear storage bins beneath each guest's seat. Two 88 cubic foot aluminum scuba tanks are positioned behind each seat, allowing divers to gear up in one place. Overhead storage bins are large enough to accommodate a Pelican camera case or Nikonos camera and flash system. Mask rinsing buckets and freshwater dip tanks for cameras are built into the stern, adjacent to the twin water entry stations.

A spacious nine foot dive platform features twin, in-water aluminum dive ladders complete with hand rails for safe exits. The ladders are hinged to lift out of the water when the *Reef Goddess* is underway. Other innovative designs include a camera assembly table built into the transom between the port and starboard entry stations. There is an external shelf and handrail across the rear of the transom and storage for an additional eight scuba tanks used for emergencies or by the divemasters. The upper sundeck is equipped with bench style seating for 20 passengers, plus a stowage area for two Zodiac Mk II GT chase boats.

The *Reef Goddess* is equipped with one-half inch and 8mm video playback



The 60 foot, twin diesel dive boat *Reef Goddess* carries divers from Hayman Island to Bait Reef, 45 minutes away. Lower left: The magnificent Hotel Hayman pool. Qantas flies from the U.S. to Sydney.

decks so passengers can view video footage taken during their dives. A day lounge area offers full galley facilities and storage space for cameras and personal possessions. The boat has two separate freshwater showers and heads.

The *Reef Goddess* is berthed at Hayman Island's new ultra-modern marina, right on the premises of the hotel. Nearby is Hayman Island's complete dive center, including a shallow and deepwater training pool, lecture classroom, scuba boutique and a security area for the storage of guest's dive equipment. The center will

offer a complete line of rental equipment including underwater cameras and 8mm U/W video equipment.

Barrier Reef Diving Services has the dive operation at Hayman Island. Owners Maureen Prior and Tony Fontes have more than 11 years of experience in diving the Whitsunday area and know the reefs intimately. Barrier Reef Diving is a Five Star PADI facility and offers advanced and specialty courses in a variety of underwater activities.

The *Reef Goddess* departs the Hayman Island. (Continued on Page 113)

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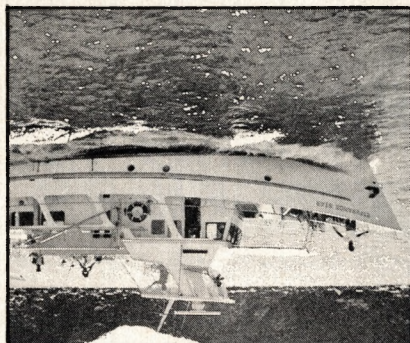
For reservations or information: Poseidon Ventures Tours • 359 San



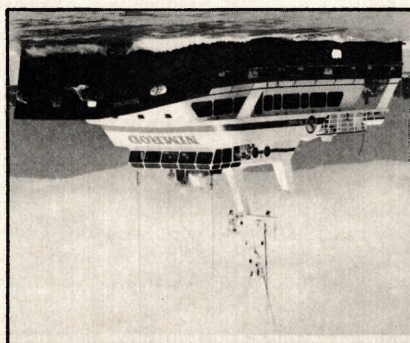
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two dives per day, as well as tanks, weights and air. is available to fit most budgets and includes three meals and full sea life makes it ideal for underwater photography. Lodging turtles (seasonal), and a huge variety of fish and coral. This color by helicopter, Heron is the home ground of tame moray eels, friendly manta rays, sea cude four dive boats and over 60 rental scuba tanks. Only 26 minutes from Gladstone Heron Island offers access to some of the world's finest diving. Full dive facilities in- HERON ISLAND The only diving resort situated on the Great Barrier Reef,

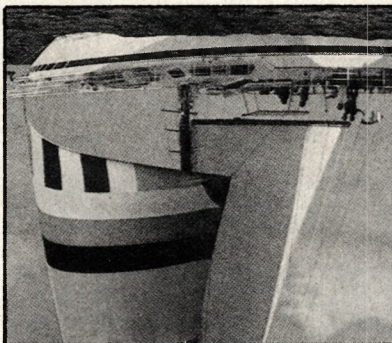
55' MV Esperance Star
8 Divers. Dep: from Cairns to Ribbon Reefs and Lizard Is.



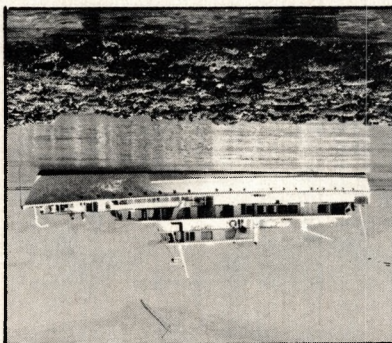
65' MV NIMROD
16 Divers. Deluxe Catamaran. Dep: from Cairns to Ribbon Reefs and Coral Sea.



55' Scheherazade
6 Divers. Motor Sailor. Dep: from Cairns to Ribbon Reefs and Coral Sea.



112' MV CORAL PRINCESS
24 Divers. Dep: from Cairns or Townsville. Ribbon Reefs, Coral Sea, Yongala Wreck.



"Australia's Great Barrier Reef State."



BRAC REEF

Brac Aquatics boats, the guests never carry gear. La Mer Diving Safari books dive packages on the *Little Cayman Diver*. You can contact La Mer at (800) 348-3669; in New York call (212) 599-0886.

Want the best of both worlds? Try the Live Aboard/Live Ashore travel package. You can split your vacation week between the *Little Cayman Diver* and the Brac Reef Beach Resort. If you only have time for a long weekend, try the Brac Reef Beach Resort special four day package; it is available August 31-November 20 and is being extended November 30-December 18 and January 4-30.

For more information write Brac Reef Beach Resort, P.O. Box 72279, Tampa, FL 33602. You can call (800) 327-3835; in Florida (800) 233-8880; in Tampa (813) 229-5359.

BOTTOM TIME II

New evidence shows Christopher Columbus first landed at Samana Cay in the Bahamas instead of San Salvador, as previously thought. On November 22, the *Bottom Time II* will leave Georgetown, Bahamas to explore Conception Island, Rum Cay, Samana Cay, Plana Cays, Mayaguana and end its cruise in the Turks and Caicos. This area has rarely been visited owing to its remoteness.

For information on this and many other adventures contact Bottom Time Adventures, Inc., P.O. Box 11919, Ft. Lauderdale, FL 33339-1919; outside Florida (800) 345-DIVE, inside Florida (305) 595-0111.

PETER HUGHES DIVE DIRECTORY

Divi Hotels has just introduced a Peter Hughes Dive Directory. This full color brochure was specifically designed with divers in mind. It contains information on the Peter Hughes dive operations on the islands of Barbados, Bonaire, Cayman Brac and the Turks and Caicos. It describes the courses offered and important information pertaining to each adjacent Divi Hotel and amenities and activities offered at each resort.

The new directory is being distributed at major trade shows. Requests for additional copies can be sent to Divi Hotels Marketing, Inc., 520 West State Street, Ithaca, New York 14850 or by calling (607) 277-3484, toll free (800) 367-3484 in the U.S. and Canada.



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Even on dry land, Loreto has plenty to offer. Like a range of fine hotels. A world-class tennis center. And Spanish missions to explore.

In Mexico, they say everything's bigger in the Baja. When you dive in Loreto, you'll know what they mean.

© 1987 FONATUR, Mexico Tourism. Another resort from Fonatur, the planners and developers of Cancun, Ixtapa and Los Cabos.



LORETO

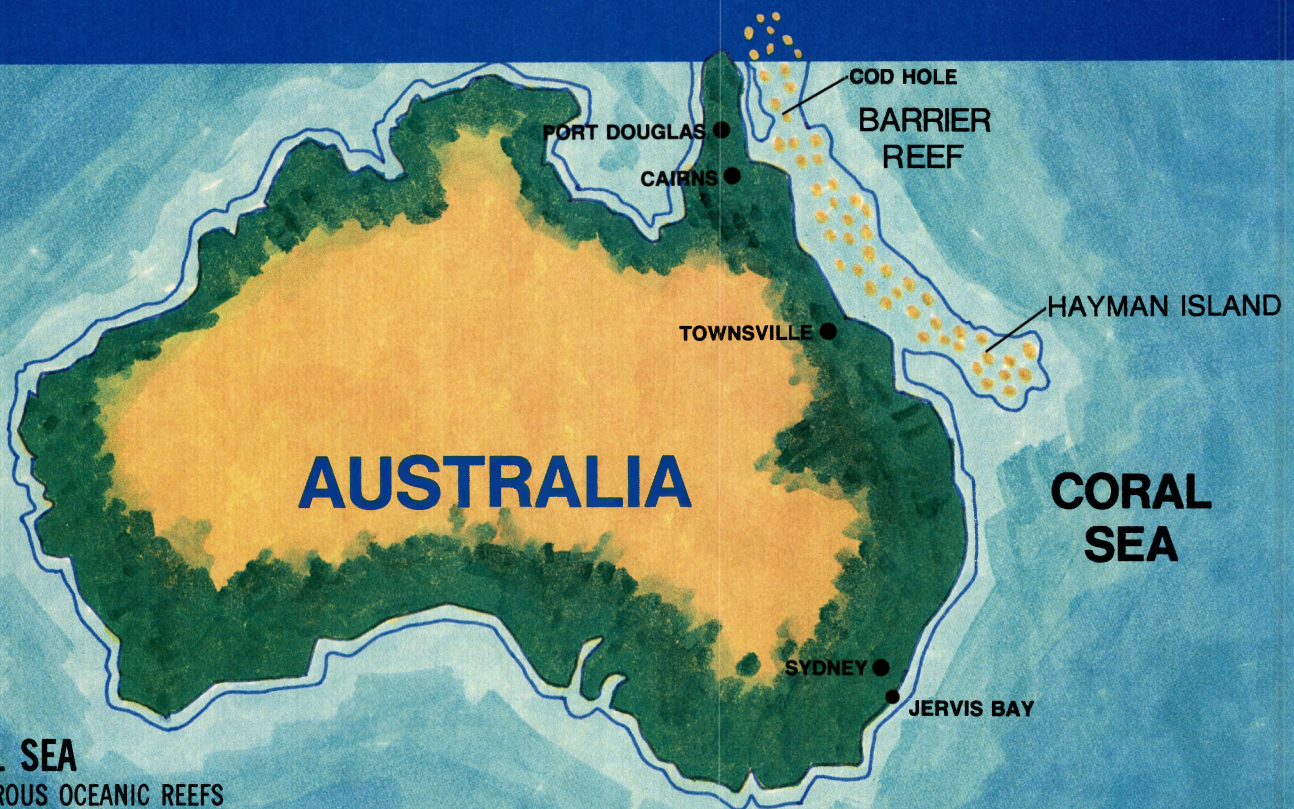
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Hayman Island is the finest deluxe international island resort in Australia.

Recently reopened after complete reconstruction costing \$150 million this idyllic resort hotel features 186 rooms 33 suites, 11 penthouses, 5 restaurants and 24 hour room service.

Direct jet access by Ansett Airlines to the Whitsunday Islands and 40 minutes transfer by luxury high speed motor yacht "Sun Goddess" will be a superb introduction to Hayman Island.

Divers will be pampered by a complete PADI 5 star training facility and the brand new 60 foot "Reef Goddess"—a dive boat which will set new standards world wide for quality and appointments.

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8 DAYS

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See and Sea (see their ad this page)



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See UNDERCURRENT REPORT '84 Vol. 9 No. 4

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Within 100 miles of Sydney, this magnificent stretch of underwater real estate easily rates as the second most popular place to dive in Australia. Massive sandstone formations covered by a gaudy richness of marine life. Great clouds of fish, many unique to these southern waters. And a multi-service dive operation. No wonder we call Jervis Bay the other place to go down under.

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DIVERS DEN



Top: Kathryn Johnston on the wreck of the *Benwood*. Above: Inside the Divers Den store. Right: Ray and Teresa Lang. Inset: Divers Den can arrange accommodations packages with the Holiday Inn in the same marina complex as the dive store. Below: The 50 foot *Good Time* can carry 52 passengers but usually only transports half that number. A six passenger vessel is also available to carry divers to more distant reefs. Below right: Divers Den is a full service, PADI Five Star development center. Opposite page: Porkfish on the *Benwood*.

KEY LARGO'S NEWEST DIVE OPERATION



Have you ever wondered why the best things in life always come in groups of three? If you really think about it, I am sure you can come up with a few ideas, I know I can. For Ray and Teresa Lang of Divers Den of Miami and Ft. Lauderdale, this adage has proven very true. They are celebrating not only their eleventh year of serving the diving community, but the opening of their third and newest dive store—Divers Den of Key Largo.

However, the best things don't stop here. The Langs have added a third dive boat, the newly rebuilt 50 foot ultra-plus dive yacht *Good Time*, to their already growing inventory. The new store and the *Good Time* are welcome additions to the only diver oriented operation that services a tri-county area running regular trips to some of the most exciting wrecks and reefs of southeast Florida.

Divers Den of Key Largo is a full service PADI Five Star development center a few hundred yards off U.S. 1. It is opposite the Holiday Inn's Holiday Harbor Marina at Mile Marker 100. The entire staff—more than 20 instructors, captains and salespeople—is constantly busy with resort courses, full open water scuba courses and student referrals. PADI advanced and specialty courses in wreck diving, deep diving, rescue, underwater

sel can carry up to 52 passengers. For comfort, however, the *Good Time* usually carries only half its maximum.

Because of its high freeboard, the *Good Time*'s engines are far below the deck. This leaves lots of deck space for easy, uncrowded gearing up. A large custom dive platform with swim-on boarding ladders makes entries and exits comfortable. Stereo music is piped throughout the boat for your listening pleasure before and after the dive. Iced coolers are available for soft drinks and forward, a large dry counter is convenient for U/W cameras and personal items.

The *Good Time* crew is courteous, conscientious and encourages passenger participation. All guests are welcome to ride the foredeck or come up in the wheelhouse to ride with the captain. In addition to the always popular explorations into the park for photography, sight-seeing and wreck diving, Divers Den also offers spearfishing and game collecting trips to reefs outside the park. For smaller groups, the six passenger *Reef Runner* is available for some of the more exciting reef sites that are farther away.

I have known Ray and Teresa for more than eight years and remember their first dive store well. However, the story began earlier than that, it started in Wichita, Kan-

and wooded hummocks.


Miami was beginning to grow rapidly and the Kendall area was the newest hot spot for community growth and urban development. Divers Den tripled in size in just a few short years and the first dive boat, the *Teresa Marie*, was purchased to better supply the growing demand for professional dive services. A second Divers Den was opened in Ft. Lauderdale in April 1984 and the second dive boat, *Reef Runner*, was purchased to further accommodate the diving communities.

Today, a phone call to any one of the three Divers Den stores can arrange a tailored vacation package at one of the most popular Key Largo motel resorts, the Holiday Inn. Conveniently within the same marina complex as Divers Den, the rooms are comfortably air-conditioned and have both color TV and double beds. Within the grounds, a freshwater swimming pool and lounge are popular for after dive hours. For later in the evenings, Key Largo has several fine nightclubs and many excellent restaurants. Some restaurant suggestions include the Quay, Italian Fisherman, Pilot House and Señor Frijoles. For a few drinks and dancing to a live band, try Coconuts, Holiday Isle Tiki Bar or Pineapples.

There are two dive trips per day; one leaves the dock at 9:00 am, the other at 1:00 pm. You can book on for a full day of diving or opt for one-half day and enjoy other watersport activities. Night diving is regularly scheduled, as are specialty trips outside the park.

The aquamarine kingdom of Pennekamp Park requires little introduction. Pennekamp is America's premier dive destination, with healthy reefs, excellent visibility, an overabundance of reef fish and an entertaining cast of other marine characters. A definite advantage of the fast *Good Time* is its ability to cover water quickly. Virtually anywhere in the park is accessible to the vessel and the captain will often run it north to some of the less heavily visited sites.

In addition to regular reef trips throughout the park, Divers Den can arrange several day excursions to explore the more than 20 sunken freighters off Miami and Ft. Lauderdale, or visit the mysterious Blue Hole on the west coast near Naples. Or, if you prefer, a day trip aboard *Reef Runner* can take you to some of the magnificent coral canyons of the Victory Cays near Bimini.

For more information on Key Largo diving and hotel packages, east and west coast diving, including Bimini excursions, contact Ray Lang, Divers Den, 110 Ocean Drive, Mile Marker 100, Key Largo, Florida 33037. In Florida call (305) 451-DIVE, outside Florida call (800) 527-DIVE. When in the area, stop by the Miami store at 12614 North Kendall Drive; (305) 595-DIVE—or the Ft. Lauderdale store at 8280 State Road 84; (305) 473-9499. Have a *Good Time!* 



photography and others are available. Divers Den is the only Florida dive store that carries all the major brands of professional equipment. In addition to sales, service and rentals, the store has a complete line of beach and sunwear, T-shirts and island attire.

Right across from the shop is the gleaming white and black trimmed *Good Time*. It is easily one of the best designed dive boats operating in the Keys today. Fully U.S. Coast Guard licensed, the ves-

sel. With a growing unrest and a passion for the ocean, Ray and wife Teresa soon moved to Florida and began to manage the dive concession at John Pennekamp Coral Reef State Park in Key Largo.

After several years of escorting customers to many of the park's well known dive sites, Ray opened his first Divers Den in 1976 on Kendall Drive in Miami's southwest section. At that time, Kendall drive was not much more than a route to the Everglades lined with sawgrass fields

CAYMAN ISLANDER... A DIVERS DEN

across from Seven Mile Beach, at Bonus Prices.

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An off beach hotel for Smart Divers, the Cayman Islander Hotel offers air conditioned superior rooms with satellite T.V., fresh water pool, Poolside Bar and Cafe...The hotel is located only a few yards from one of the most beautiful beaches to be found anywhere...

The best diving in the Caymans is done with Bob Soto's Diving Ltd., which features a fully equipped dive shop on the premises...Enjoy our **BONUS FILLED BONUS DIVE PACKAGES**

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Mention this ad when making your reservations and **receive free**, upon arrival at the hotel, a Bob Soto's T-Shirt. Also ask about our **BONUS PRICES** for three and five night packages.



**Cayman
Islander**

GRAND CAYMAN, B.W.I.

DEL MAR/LA CEIBA

(Continued from Page 91)

is only a few steps away from the dinner table. During the evening music and spir-its are served until midnight. In the morning, classical music sets the mood for La-fitte's express breakfast service. Whether you want a leisurely meal or a quick one, La Ceiba has you covered.

Del Mar Aquatics is the perfect complement to La Ceiba Hotel. Like the resort, this dive operator offers both excellent service and modern facilities. Del Mar Aquatics headquarters is just a short walk down the street. It includes a full service retail store, dive center with two 15 cfm compressors, pool and dock. These resources give Del Mar Aquatics' instructor, Terri Dethloff, the flexibility to conduct the full gamut of scuba classes from introductory and referrals to assistant instructor. Del Mar Aquatics' dock includes rinse stations, showers and private lockers, (La Ceiba Hotel guests may store their gear either at the resort or at Del Mar Aquatics). Like La Ceiba, Del Mar Aquatics' layout is diver friendly.

After signing in and presenting your C-card, you're given an orientation by operations manager Daniel Ayala. Although his duties now keep him shorebound, this PADI master instructor draws from his decade of Cozumel divemastering experience; he knows what divers need and want. By the way, don't worry about language problems; Daniel's command of English is better than this author's.

Del Mar Aquatic's boats deserve special mention. This company has initiated a quiet revolution on Cozumel. With twin Johnson 225s powering their new vessels, *Splash 1* and *Splash 2*, these craft are unquestionably the fastest dive boats on the island. They hit the dive sites in one-third to one-quarter the standard travel time; leaving the pier at 8:30 am puts you on many of the most famous walls by 9:00! Instead of returning around 4:00, the new boats pull back in at 12:30.

With only 16 divers on the 33 foot long vessels, there's plenty of room. Scuba equipment slides under the wide benches. Fresh water flows to the built-in sink on the two tiered camera table and to the shower near the stern. A canvas top covers the entire passenger area.

Diving from the boats is easy. Striding off the water level platform, guests arrange themselves along a floating buddy line. When the group is ready, they leisurely descend. Your guided tour will be led by a veteran divemaster such as Carlos Mena. As your week progresses he may introduce you to his marine friends that include spotted and green moray eels, nurse sharks, five pound lobsters and one-half dozen enormous groupers. When you return to the surface, the boat

circle #157 on Reader Service Card

is there waiting for you. Staff members take your camera and heavy gear. On board, as you head to the ice chest for a cold drink or to the front table for the spread of fresh fruits and sandwich makings, you may notice the crew is already changing your equipment. In keeping with the best Caribbean style, you'll never have to carry a tank. Your sole obligation while diving with Del Mar Aquatics is to enjoy the day.

There is nothing rigid about Del Mar Aquatics. You can choose to be picked up at either La Ceiba's or Del Mar Aquatics' dock. If your group wishes to make the more traditional two hour lunch stop on one of Cozumel's white sandy beaches and play some volleyball or bask in the sun, it's no problem. Special requests for dive sites are also welcome. Since Del Mar charters depart twice each day, at 9:00 and 12:30, your group can make arrangements to dive in the afternoon for a change of pace. As this article goes to press, Del Mar's 25 foot *Splashito*, driven by twin 50s, enters service; four to six divers may use this boat for private tours. Want to try something unique? How about a night dive on Palancar. Throughout your stay with Del Mar Aquatics, you'll probably be with the same crew. These people work very hard. Although you will never be approached for money, a small tip goes a long way toward thanking the crew, whose considerable effort makes your stay so easy.

Service doesn't end when you leave La Ceiba and Del Mar Aquatics. At the airport when departing divers were checking in at Continental's counter, Marcia Esma quietly opened another position and brought in an extra baggage handler to help with the luggage. None of the passengers noticed; they were chatting enthusiastically about their last dive on Santa Rosa. By the time they left the counter, their conversation had moved onto scheduling return trips to Cozumel.

With the peso declining in value, the U.S. dollar buys more and more. This added value shows in the local marketplaces, restaurants, hotels and dive boats. Cozumel is truly a divers' bargain. In one telephone call to Two Worlds Travel—(800) 446-2166; in Texas call (713) 446-2166—you can get immediate confirmation of your reservations. All six representatives are certified divers who have been to Cozumel; it's great to talk with travel agents who speak scuba. For more detailed information write: Two Worlds Travel, 1307 First Street, Humble TX 77338. You can also contact La Ceiba Hotel direct. The number is (800) 621-6830; in Texas call (214) 669-1991. ✕

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SKINNYDIPPER

(Continued from Page 88)

300,000 dives over the past four years. According to Orca, the USN tables can produce as many as three or more decompression problems for 10,000 dives. Divers using the Edge report one problem per 10,000 dives. Sources for this data include DAN, which monitors accidents and collects data on sport diving.

DISCLAIMER

While Orca Industries has tried to make the SkinnyDipper as safe as humanly possible, they realize there is still a tremendously wide variance in human physiology. No dive computer could possibly guarantee 100 percent avoidance of a decompression accident. The company's goal is simply to minimize the possibility to a minute fraction of a percent.

Orca states clearly in its owner's instruction manual that diving can be hazardous. The SkinnyDipper is to be used only by certified divers who are fully trained and have a complete understanding of the risks involved. The SkinnyDipper cannot prevent the bends even when used according to the manufacturer's instructions. It can, however, greatly reduce the risk of getting the bends.

Orca suggests that all SkinnyDipper users first familiarize themselves thoroughly with the operating instructions. They should also wear back-up instruments such as depth gauges and dive timers and should periodically confirm the calibrations of their computer with other instruments. This is good advice for anyone using any type of dive computer.

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Dog Hole Schooners were first seen along the Northern California coast 125 years ago. These were shallow draft, mostly schooner rigged sailing vessels. Working out of impossible ports called "dog holes," they hauled lumber, produce, household goods and people to and from the then bustling village of San Francisco. Working as far north as Brookings, Oregon, these small schooners played an important part in developing the lumbering and shipping industries, as well as the emerging coastal communities. They brought in everything people needed to survive and profit while living and working on this empty coastline bordering the world's richest forests; the redwoods of California.

Several months ago I spent two weeks probing the shores and waters of Mendocino County in search of the remnants of this fascinating era of California's maritime history. I found an unbelievable saga of the past.

HOW IT ALL STARTED

The wreck of the heavily laden sailing vessel *Frolic* started it all on the stormy night of July 26, 1850. The 200 ton Boston brig was carrying a valuable cargo of silk, lacquerware, china and opium from Bombay and Hong Kong to San Francisco. Seeing numerous lights along the shore, the master of the *Frolic* believed he was off San Francisco and stood in toward the lights. Unfortunately, he was about 120 miles north of his destination and, in gale force winds, much too close to a lee shore. His vessel was driven aground and finally sank in a cove near where Point Cabrillo lighthouse now stands. We will come back to the wreck and the cove later.

When news of the wreck reached Bo-dega, then a mere village a few miles north of San Francisco, a pack train party was organized and worked its way over Indian trails along the heavily wooded coast to the wreck site. The pack train, loaded with some silks and other valuables, returned safely to San Francisco.

The importance of this trip by the adventurous salvors was not that they recovered part of the treasure from the foundered vessel, but in their discovery of the redwood forests stretching from Russian Gulch in Sonoma County to the Oregon border. One man reported, "The forests up in that area have no end. A medium sized tree could provide enough lumber to build one-half dozen churches." In the next four decades the northwest coast of California became known for its tall trees, tall masts and tall stories about the exploits of the dog hole schooners and their captains. In recent years it has also become known to a few divers for the relics of the past that are sometimes found in the dog hole ports.

Just when or how the indents in the



SEARCH FOR DOG HOLE SCHOONERS

BY E.R. CROSS



Top: The schooner *Bobolink* aground at Kent's Point on the south side of Mendocino Bay. Above: Loading passengers "by the wire" to a dog hole schooner.

rocky coast of northern California got the name "dog hole" ports, no one seems to know for sure. One writer presumed the name was given them because some salty deepwater captain declared there was hardly room for a dog to turn around in one, let alone get a sailing vessel in and out safely. Another story has it that an equally salty deepwater sailor called them dog holes simply because a proper dog wouldn't let itself be caught dead in one. In either case the descriptions were appropriate. The dog hole ports are really dogs. I found modern boaters, mostly divers, still using some of them in their

search for abalone and fish.

HOW THE DOG HOLE SCHOONERS EVOLVED

By far the earliest seagoing vessels on the northwest coast were probably Chinese and Japanese junks that were blown off course by typhoons. Dismasted, damaged and dashed on shore, they eventually became the legendary beeswax junk, or the jade junk or other, unnamed, junk wrecks of the West Coast.

The first vessels to purposely sail along the California and Pacific Northwest coasts were ships of Spain, Russia and

England. A little later some smaller vessels built in Mexico came at least partway to the area. All of these were quasi-governmental expeditions engaged in exploration and land acquisition.

The first vessels to ply the coast in trade were huge, sleek, fast clipper ships sailing out of San Francisco for ports around the world. Trade along the coast was carried on in comparatively small vessels rigged as brigs, brigantines, barks, barkentines and, later, schooners. Then came the slow, smoky, steam engine-assisted sailing vessels and finally, those ships propelled by steam alone.

By 1851 a great demand had developed for wood. Wherever there was timber, sawmills sprang up along the shores of the ocean and banks of rivers. The same people who had backed the expedition to salvage the cargo of goods from the wreck at Point Cabrillo also needed wood and were aware of the redwood coast. Soon-to-be lumber barons set out to find a way to harvest these forests of wooden gold.

At that time only a few small sailing vessels were available to haul the equipment for small sawmills up the coast. Most were barks, barkentines, brigs and brigantines—all of which were at least partially square rigged. They were not suitable for beating up the California coast against the strong prevailing northwest winds. Their passage from San Francisco to the Mendocino area usually took at least five days. But, if the weather was not favorable, which frequently was the case, a voyage might take as long as several weeks. Sometimes the vessel failed to arrive at all.

Schooners, with their fore-and-aft sail plan, and with sharp bows and rounded sterns, were much faster and, even more important, could beat into the prevailing wind. The first of these faster vessels was put into service about 1861. The real dog holer had arrived.

THE DOG HOLE SCHOONER

By 1865 there were at least 100 sailing vessels carrying cargo up and down the Northern California coast. A few made voyages to the coasts of what are now Oregon and Washington. Some were still small, brig rigged ships, but most were by now schooner rigged. Also, a few had already been lost and their artifacts were scattered across the ocean bottom.

Most dog holers displaced less than 200 tons. Many were less than 100 tons. They were constructed of wood, some in the few shipbuilding yards that sprang up along the California coast from San Francisco northward. Most of the dog holers were compact, two masted vessels, although a few were rigged with three masts. They were wide of beam for their length and shallow in draft. Basically double ended, short in length and broad in

the beam, with large sails, they were extremely maneuverable.

The smaller schooners carried a crew of three or four seamen plus the master. Larger vessels of 100 tons or so carried a crew of six to eight plus the captain. The skippers of these dozens of small sailing ships were either of Swedish, Norwegian or Danish ancestry and the fleet of redwood coast vessels became known as the "Scandinavian navy." On the other hand, the crews who worked the sails, loaded cargo and stood the watches, were from European countries and a few were from the Sandwich Islands (Hawaii).

Living conditions on board the dog holers were, by standards of that era, quite good. Voyages were short. Food was plentiful. What appeared to be a complete lack of discipline was more than compensated for by the total respect the crewmembers had for their captains. No matter how difficult the assignment, the skipper's orders were carried out. Also, members of the crew usually had on board all of their personal belongings or at least more than would normally be found on deepsea sailing vessels having much larger crews and relatively little living space per person.



A schooner at Mendocino—the scow (loading at chute) will load another vessel.

THE DOG HOLE PORTS

In 1850 the redwood coast from Fort Ross, California to Brookings, Oregon had almost no harbors worthy of the name. Four ports—Mendocino, Noyo, Humboldt Bay and Crescent City—could handle the 200 tonners at piers constructed inside the bays in protected waters. Twenty other open water ports had water deep enough and were large enough for vessels in the 100 ton class. The rest of the dog hole ports were merely small indentations in the rocky cliffs towering 100 feet or more above the crashing waves. A few ports were nothing more than land-

ing sites in open roadsteads, close enough to a high cliff that lumber could be slid down a chute onto the deck of the schooners. All the ports had the always threatening presence of changing currents, foul weather, foggy days and barely hidden rocks. There were no light-houses and no buoys or other aids to navigation. Only the knowledge and experience of the captains could ensure the completion of the voyage.

According to one story, a lady passenger on one of the dog hole schooners that was lying offshore on a pea-soup foggy day, asked the Swedish captain how he could find the port in such weather. Without hesitation the skipper replied, "Why, I've been there before!"

Of the 68 known ports, 65 were in Sonoma and Mendocino counties. The development of these was owing to the insatiable demand for more and more lumber—particularly in the rapidly growing, comparatively wealthy city of San Francisco. There were no roads, no railroads and no method of shipping lumber from anywhere north of San Francisco to that rapidly expanding city; none except by Herculean effort over rocks and crashing breakers onto the dog hole schooners and out to sea. Wherever there was a good stand of timber near the sea, a sawmill would be built near a site the lumberman hoped a vessel could be moored while loading.

The closest lumber mill and dog hole port to the north of San Francisco was at a landing called Jenner about 75 miles up the coast from that city. In the next 184 miles, all the way to the northern border of Mendocino County, there were 65 dog holes; an average of one every 2.8 miles.

The first mill on the redwood coast was established near the mouth of a river the Indians called Bool Dam. This is Big River of today's maps near Mendocino.

More information will be provided on the many dog holes in the section on How to Search for Dog Hole Wrecks.

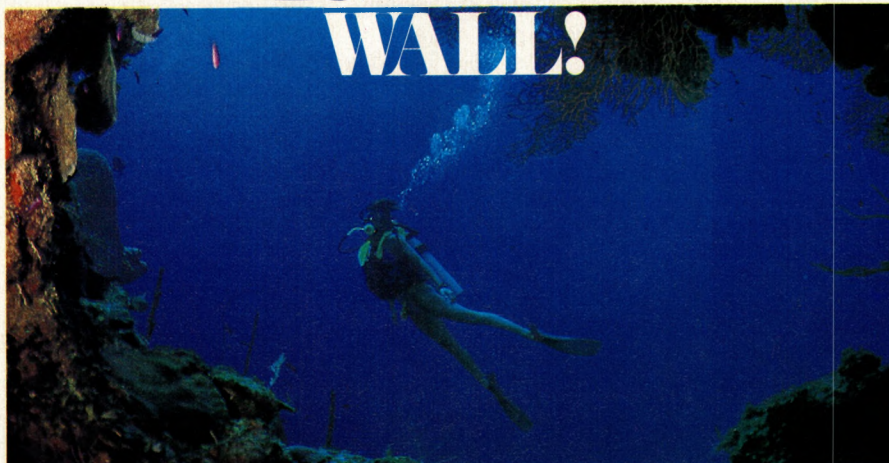
CARGOES

To know what divers will be looking for in their search for relics of the dog holers, it is necessary to know what kinds of cargoes these vessels carried. There will be no treasure, as such. Predominantly, the cargoes were wood and wood products. But there was also enough iron, copper, lead, glass and pottery and old bottles to make interesting U/W potholing.

Incoming cargoes of the schooners were as varied as were the needs of the people, including the 300 Indians at a *rancheria* one mile east of Mendocino. In the early years all sales of imported goods were handled by the mill company and included such items as cook stoves, windows, blocks of salt, crosscut saws, block and tackles, coils of rope, and axes and shovels by the hundreds. For the mill

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DOG HOLE SCHOONERS

there was also material to build water tanks and iron pipes to pipe the water to various operations. Shipments for the developing farms of the community included dairy cattle; stock of other kinds such as horses and sheep; wagons and buggies to be used on the few short roads around and between the farms; harnesses and tools of all kinds to keep the developing ranches—many of them of 1,000 or more acres—in operation.

From the dog hole ports, lumber barons shipped redwood ties, posts, tall poles, shakes, firewood, staves—and tons of bark from the tan oaks also growing in the dog hole port areas. Local farmers and cattlemen shipped wool, hides, potatoes, oats and other farm related products.



A steam assisted sailing schooner tied up at a mooring in Mendocino about 1905.

The number of vessels received, off-loaded and then loaded for shipment at the dog hole ports is impressive. Westport is a small port. In the period from 1878 through 1883, records indicate the following shipments:

PRODUCT SHIPPED	AMOUNT SHIPPED
Tan bark	6,150 cords
Firewood	356 cords
Redwood shakes	147,000
Redwood posts	261,712
Redwood staves	44,000
Redwood ties	396,047
Redwood shingles	165,000
Lumber	10,676,216 board feet
Wool	17 tons
Potatoes	37 tons
Oats	45 tons
Hides	9.5 tons
Number of vessels	259
Cargo received	2,504.5 tons
Vessels sunk at Westport	8

Some of the dog hole ports were larger and busier than Westport. Others were smaller. One dog hole port was organized, a chute built, and for some reason, never used.

Until about 1870 there were no roads into or out of the dog hole ports except for one six mile road from Mendocino to the Milikin lumber camps; a road to nowhere. All goods were transported to inland destinations over ancient Indian trails on the backs of the Indians or pack animals. Probably the largest object ever transported to the redwood coast via dog hole schooner was a railroad engine. There is no record of how this extremely heavy and large object was unloaded. Obviously, it was set on tracks for movement to its permanent location.

In addition to items from the cargoes, divers can find relics of the vessels themselves and occasionally tools or curios that were carried on board by crewmen.

LOADING AND UNLOADING

Just as every port differed, so did the methods of loading the vessels that entered the ports. They included mill-site loading, lightering, slide chutes, "by the wire" and wharfs. Frequently, more than one system was used.

When a river or well protected harbor was deep enough for the vessel to enter, it tied up at a wharf at the mill. The cargo was then loaded directly onto the ship.

In all other cases, the lumber was hauled overland from the mill by the shortest possible route to the loading site, usually by six to eight horse/oxen teams pulling crude wagons. Almost always a pier of some sort was involved. It might have been a short pier to shallow water for loading lighters, or a much longer pier, extending into the breakers, for use with chutes.

Lighters were loaded at piers in shallow water, then pulled to the ship by ropes. Lighters were rectangular floats of shallow draft capable of carrying 20 to 30,000 board feet of lumber on each trip. Since each piece of cargo had to be handled twice by manpower, this was a slow way to load and other means were developed whenever possible. Lighters were sometimes used under chutes and were also loaded "by the wire."

For the first four decades of dog hole shipping the most common method of loading was the slide or apron chute. In this method a trestle was built from the cliffs, across the rocks and breakers, out to a depth of water that permitted the vessel to tie up close to shore or near the face of a cliff. From the trestle extended an A-frame device that was held in place by a system of guy wires. From the A-frame extended a movable slide chute, also held in place by block and tackle systems to adjust the height to compensate for tidal changes and for the surging action of the vessel. Gravity caused the

(Continued on Page 112)

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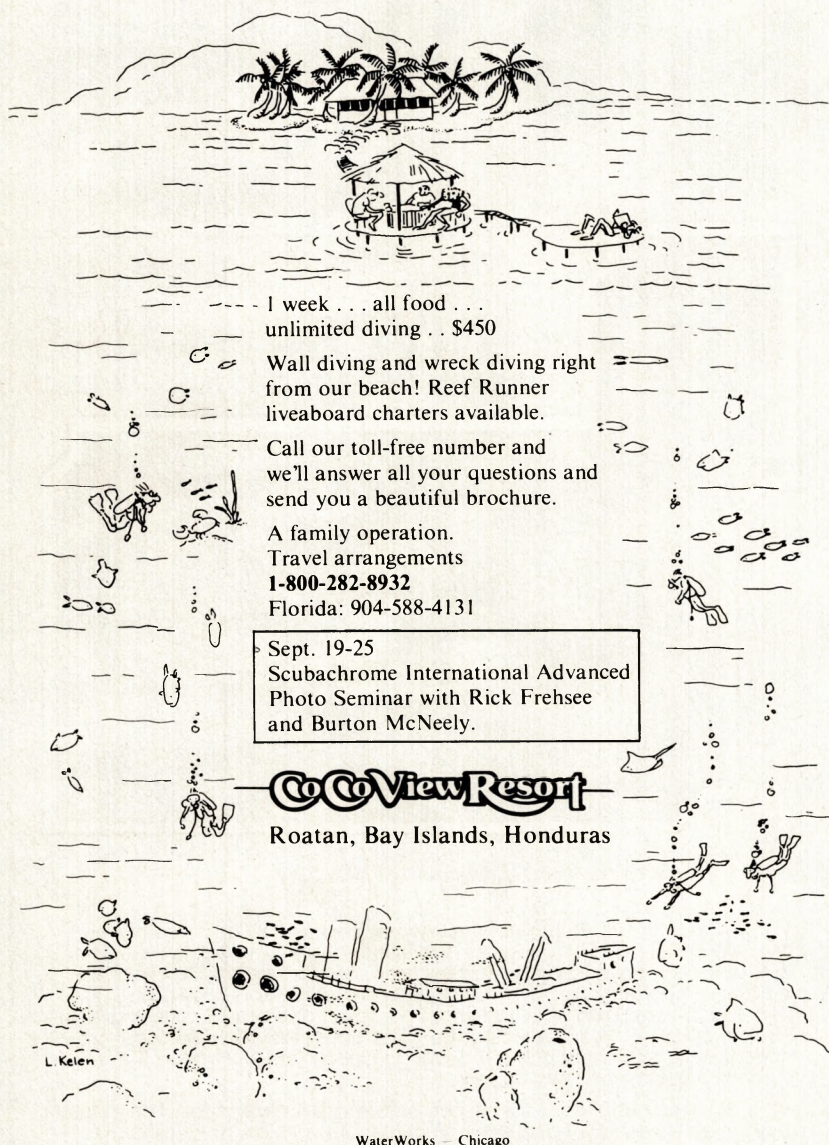
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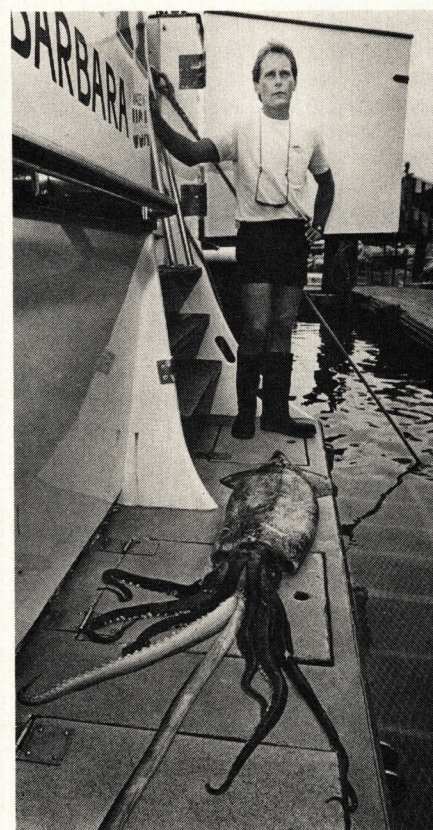
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CALIFORNIA DIVER BAGS GIANT SQUID

7 Footer Is Record
For Santa Barbara

BY HILLARY HAUSER

A giant, seven foot squid was brought into Santa Barbara Harbor in May, the catch of a scuba diving charter boat captain. The huge ten-legger was greeted by a crowd of curiosity seekers, fishing fanatics and marine biologists.

The marine biologists said the maroon and grayish-white squid is the largest to come out of the Santa Barbara Channel in recent history. The body measured three feet and the tentacles, four feet.

The squid was speared off the north side of San Miguel Island by David Sherwood, second captain of the dive boat *Truth*, which operates out of the Santa Barbara Harbor. Sherwood said he was surfacing from a "boring halibut dive" over a sandy bottom when he looked up to see the creature swimming above him

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David Sherwood stands on the dive platform of the *Truth* beside the huge squid he speared off San Miguel Island. The animal had been swimming repeatedly into a reef as if it were dazed. This large squid species, *Moroteuthis robusta*, is normally found in very deep, open ocean water.

in 30 feet of water.

Sherwood said the mood of the dive changed quickly after that. "I thought it was a seal, dive-bombing me."

However, Sherwood quickly realized the animal was not a seal but a squid. He also realized it wasn't acting right. Instead of behaving ferociously, like Captain Nemo's nemesis, this squid kept swimming into a reef, as if it were dazed.

"It kept bumping into the rock," Sherwood said. "I knew something was wrong with it, that it was going to die."

Using the speargun he had taken with him to hunt halibut, Sherwood shot the squid and brought it back to the *Truth*. Then he radioed ashore, to say he was bringing the squid in. By the time the *Truth* pulled into Sea Landing, Paul Scott, associate curator of invertebrates at the Santa Barbara Museum of Natural History, was waiting. So was Shane Anderson, a marine collector and naturalist with the UC Santa Barbara Biological Sciences Department, and Genny Anderson, a marine biology professor at Santa Barbara City College.

The biologists said the squid catch is a very rare one. "We have nothing close to seven feet in our collection," said Scott, who identified the species as *Moroteuthis robusta*. "It's three times the size of the largest squid we have."

Scott said the animal is normally found in very deep, open ocean water, and although its range extends from Alaska to California, it is very rarely found in the Santa Barbara Channel. "Usually, you'd find it in the open ocean, on the other side of the islands," Scott said.

Inspecting the squid, the scientist said it was in "remarkably good shape," although chop marks on the animal's head may have been caused by the propeller of a boat.

Scott also said that Sherwood's description of the squid's behavior, and the fact that it was found in such shallow water, signified it was probably nearly dead. "These animals have good eyes," Scott said. "They are fast and there is no way they would let someone get that close—which means it was not healthy."

Giant squid also have short life spans, Scott said. He figured the age of Sherwood's squid at about two years—close to its "natural end."

Scott said museum scientists will probably dissect the animal to learn more about its eating habits, where it lived and other life facts. "The giant squid is poorly known, in terms of biology, so any landing is important," Scott said. "This is a record."

BONAIRE



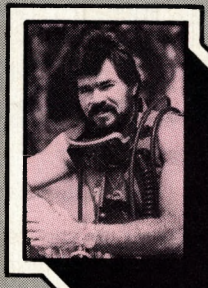
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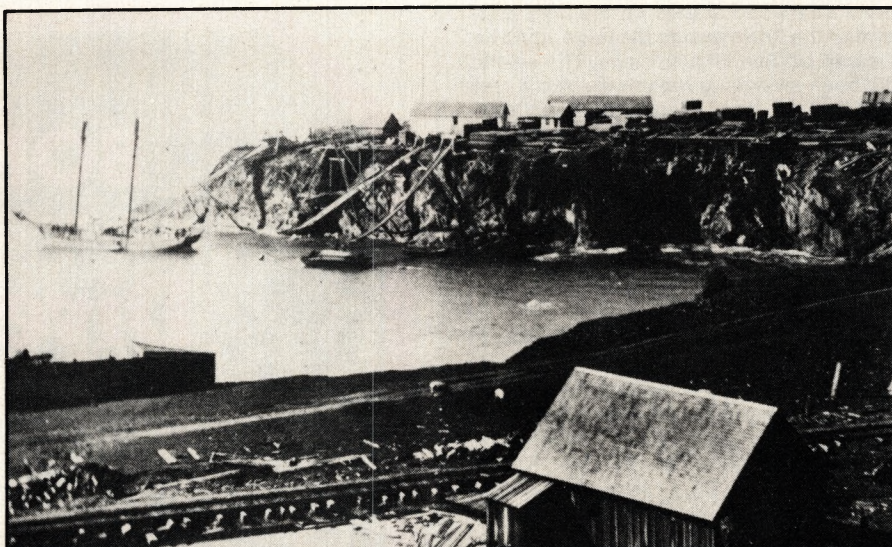
DOG HOLE SCHOONERS

(Continued from Page 109)

cargo to slide down the chute. An adjustable "apron" at the seaward end of the chute controlled the speed of the cargo when it neared the deck. Some chutes extended 200 to 300 feet over the ocean.

"Under the wire" loading methods were developed after high strength wire was invented in the 1870s. It got its name because the main cargo wire extended from a pier head, or from a high cliff on shore, out over the water and well across the cargo vessel. There it was attached by a buoy and chain to a very heavy anchor secured so the weight of cargo would not move it. The vessel to be loaded was moored under the wire. When it was in place the cargo wire was pulled taut by equipment on shore and loading was started. A sling, filled with lumber or other cargo, was lifted by a traveler block, which then was allowed to slide down the cargo wire until it was directly over the vessel. It would then be lowered to the deck and removed by the crew and either stored in the hold or as deck cargo. This was a much faster means of loading since the cargo was handled by the sling load rather than in separate pieces.

Wharf loading was used in some areas



The Mendocino loading facilities about 1880. A large schooner is being loaded by a 200 foot long chute. Note the A-frame holding the long chute over the vessel.

as the only means of getting cargo to a vessel. At other times chutes or wires, and sometimes both, were used in conjunction with a wharf installation. A few wharves were 1,000 feet long by as much as 60 feet wide at the outer end where machinery to handle the cargo was installed. Wharves were probably the most expensive facilities to build and often had the shortest life span owing to damage by marine borers and, frequently, by wave action from storms.

Many of the loading systems, wharves, chutes, wires or lighters were in use at the same place for as long as 50 years. During those years a lot of material was lost during loading and unloading and those sites should produce artifacts. ~~xxx~~

EDITOR'S NOTE: Search for the Dog Hole Schooners will continue. Our next installment will concern finding and diving the remains of these old wrecks.



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DOWN UNDER

(Continued from Page 95)

man Island marina each morning for a 45 minute ride to fabulous Bait Reef. The trip includes a minimum of two, one tank dives, snorkeling and a lavish smorgasbord lunch. Bait Reef is a large circular ring of coral formations that enclose a lagoon and offer superb diving on both the inside and outside of the reef line. Protected by the Great Barrier Reef Marine Park Authority, this remarkably lovely coral reef area is home to thousands of fish, soft corals and invertebrates. Manta rays are frequently seen from May through October and fish feeding stations attract many tame maori wrasse, coral trout, lunar wrasse and harlequin tuskfish. Bait Reef is an ideal location for fish-watchers and underwater photographers.

Some of the most popular dive sites around Bait Reef include Manta Ray Drop-off, a vertical wall that starts at two feet and ends at 100. The Maze is a labyrinth of coral canyons with depths ranging from two to 40 feet and featuring a large, tame brown moray eel. Gary's Lagoon is a shallow coral valley with depths ranging from 2 to 40 feet and featuring a four foot long green turtle. Southern Face is another wall with depths ranging from 10 to 80 feet. Stepping Stones #1 is a series of flat topped coral heads in depths from 2 to 60 feet. Stepping Stones #5 is a similar formation.

Hayman Island can be reached by flying direct to Sydney from either San Francisco or Los Angeles aboard Qantas, Australia's international airline. From Sydney you can fly direct to Hamilton Island in the Whitsunday Group via Ansett Airlines and then take the Hayman Island ferry from Hamilton to the resort.

For further information and reservations contact: See & Sea Travel, 50 San Francisco Street, Suite 205, San Francisco CA 94133. Telephone (800) 348-9778; in California (415) 434-3400. 🌊

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Gold Coast Divers, Inc. has added the *Gold Diver III* to its fleet of boats at the Miami Beach Marina in Florida. The *Gold Diver III* is a new, custom, 47 foot aluminum boat powered by twin Detroit diesel engines. The cabin is air-conditioned. The boat will attain speeds of 20 knots. Although certified for 28 passengers, trips are limited to 20. Besides local trips, one day Bahamas trips are scheduled.

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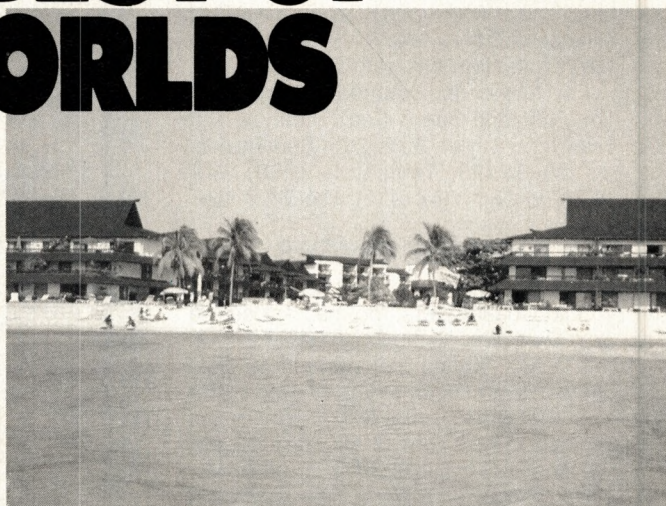
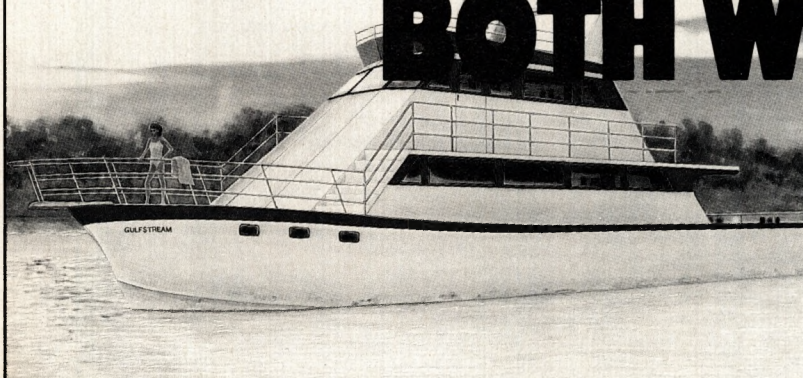
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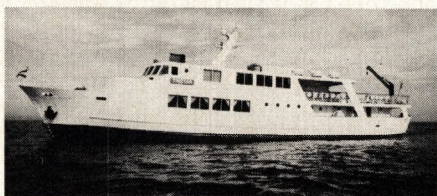
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
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For further information contact See & Sea Travel, Inc., 50 Francisco Street, Suite 205, San Francisco, CA 94133 or call (800) DIV-XPRT; in California (415) 434-3400. 


SUNSET HOUSE/ HANDICAPPED DIVERS

Adien Briggs, owner of Sunset House, recently renovated four deluxe hotel rooms as well as installed wheelchair ramps around the property to accommodate wheelchair diving and nondiving guests. The rooms now have special shower heads and various other accommodating extras. Ramps were installed at strategic entrances to areas such as My Bar and to the property's outdoor barbecue pit area. By the very nature of the property's design, the entire walkway system, right down to the boat slipways, is accessible to wheelchair guests.

Sunset House recently hosted its first handicapped scuba group, the Moray Wheels. The group members thoroughly enjoyed their stay, experienced spectacular diving and were able to get around the property without any problems at all.

A special Sunset House promotion, in conjunction with Tortuga Rums and Cayman Airways, was recently launched. Twelve Tortuga Rum bottles, each filled with three gift certificates—including a four day/three night stay at Sunset House, a case of Tortuga Rum and a round trip ticket on Cayman Airways originating from any of its gateway cities—were placed at sea two miles off the shores of Grand Cayman.

It is expected the bottles will be carried by the currents across the Caribbean and will eventually be washed ashore anywhere from the Florida Keys to possibly even Europe.

Sunset House is on the southwest side of Grand Cayman, one mile south of George Town. For more information, please call (800) 854-4767 or write to P.O. Box 479, George Town, Grand Cayman, BWI. 

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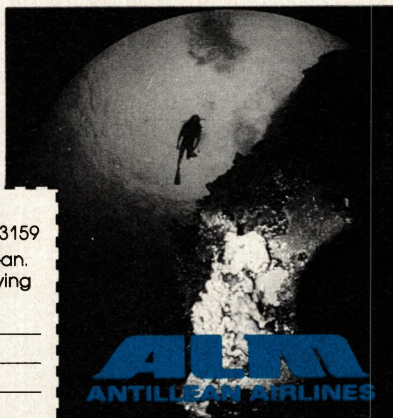
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CAP'N DON/BONAIRE ANNIVERSARY

Bonaire observed a new "holiday" recently with a celebration honoring Captain Don Stewart for 25 years of dedication and service to the island's tourism and scuba diving industries. Lt. governor George A. Soliana presented a plaque on behalf of the island government of Bonaire honoring Stewart as the "father of diving and tourism" and for his dedication to island conservation, development and education. Bonaire Government Tourist Bureau acting director P.N. "Niki" Tromp presented Stewart with a plaque




on behalf of the Bonaire Regatta Committee, honoring Stewart's contribution to the establishment of the inaugural Bonaire Sailing Regatta.

Stewart was also honored with the dedication of a new dive site dubbed Cap'n Don's Reef and the relocation of the mast from his shipwrecked *Valerie Queen*, on which he first sailed to Bonaire 25 years ago. The mast was removed from the grounds of the Flamingo Beach Club, to the grounds of Stewart's newest property, Cap'n Don's Habitat. In addition, Stewart regained possession of his ship's masthead, the Golden Trader, destined to become the first artifact in the Captain Don Stewart Marine Museum.

Stewart was also appointed president of the new museum bearing his name and will oversee the development of a newly-approved sea-tether mooring program. The program will not only improve mooring techniques, but will increase the number of Bonaire Marine Park moorings by 100. These moorings can be named after island residents, divers or friends of Bonaire for a minimum donation of \$150.


Recognized as a living legend in the sport diving world, Stewart pioneered Bonaire's diving and tourism industries. As self-appointed guardian of the reef, he was responsible for the development of the island's marine park and other con-

servation measures, as well as safety and training advancements in the diving world. Stewart established Bonaire's first sport diving station, underwater photo lab and YMCA diving school. In the field of island conservation, Stewart developed the Council of Underwater Resort Operators (CURO), the CURO Training Center and the island's reef mooring program. He has helped develop three hotels, helped form the Bonaire Hotel Association and helped organize the sailing regatta. 

GOLDEN TULIP ARUBA

The Golden Tulip Aruba Caribbean Resort and Casino, in conjunction with Pelican Watersports, is offering a variety of dive packages. The Pelican dive package rates are based on per person, double occupancy and include ocean or garden view accommodations with private balcony, a Golden Tulip T-shirt, welcome cocktail and manager's cocktail party, free daytime tennis and free use of the resort's health and fitness center. Rates are available for divers and nondivers accompanying a diver in the room.

For the nondivers on the trip, the Aruba Caribbean has its own full time diving instructor and a free introductory diving course is given at the resort's pool. Pelican Watersports also offers snorkel/sailing excursions and a selection of other enjoyable watersports. Hotel amenities include a rooftop health and fitness center, island sightseeing tours through the Pelican Tour Desk, four tennis courts, restaurants, shopping arcade, casino and Fandango night club.


For information on the Golden Tulip see your travel agent or contact Maduro Travel, 1080 Port Boulevard, Miami, Florida 33132; (305) 373-3331 or (800) 327-6709. 

GALAPAGOS ADVENTURE

Go Diving, Inc., dive travel specialist for 18 years, is offering a diving adventure in the Galapagos Islands, 300 miles off the coast of Ecuador, South America. Divers will come face to face with nature just as Charles Darwin did when he arrived on the islands 150 years ago. Dive with the sea lions, penguins and marine iguanas. Sea turtles, spotted eagle rays, golden rays and huge mantas glide within easy view. Clouds of bonita and other pelagics sweep across the dive sites.

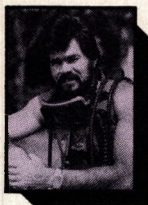
Daily shore excursions offer a chance to explore the islands uninhabited by man, but teeming with birds and animals that are unafraid and offer excellent close-up photo opportunities.

Home base is the newly christened 76 foot *Bartolome*. It provides eight state-rooms, each with head and shower.

For more information and additional side trips into Ecuador, Peru and the Amazon, call or write Go Diving, Inc., 7630 West 78th Street, Minneapolis, MN 55435; (800) 328-5285 toll free, in MN (612) 544-7168. 

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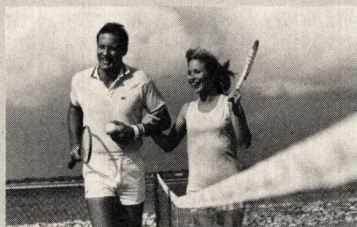


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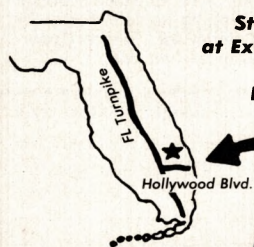
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THE AKUMAL DIVE SHOP CAVE COURSE

Jim Coke, instructor in cavern and cave diving, is now teaching a basic cave course on the second and fourth weeks of each month at The Akumal Dive Shop. Coke provides students with all of the specialized gear needed for the two and one-half day, five cave course, at no separate cost.

A native of Minneapolis, Minnesota, Coke holds a B.S. in history from Beloit College in Wisconsin. He is the only cavern and advanced cave diving instructor on the Yucatan/Belize coast who is certified by the National Speleological Society Cave Diving Section. In addition to authoring many published articles on cave diving, Coke lectures in Florida and has explored more than 20 *cenotes* in the Akumal area. Two of the most popular with divers are the Carwash and The Temple of Doom. Both are spectacular sites for the underwater photographer.

The Akumal Dive Shop, now in its 14th consecutive year of business, is the longest established dive center in the Mexican Caribbean.

Information on the basic cave course and other cavern and cave diving courses leading to a NSS/CDS certification can be obtained by writing to Jim Coke, The Akumal Dive Shop, Postal 1345, Cancun, Q.R., Mexico, 77500.

SURFSIDE MOVE

Surfside Watersports of Grand Cayman has new headquarters in the Selkirk Watler Building on the waterfront in George Town. Surfside will still offer beach-based activities from the Beach Club Colony on Seven Mile Beach.

Facilities at the new headquarters include a loading dock to accommodate dive boats, a scuba compressor, 200 tanks and a walkway to allow direct water access for shore divers. A scuba equipment rental and repair shop, a dive retail store and spacious upstairs (which accommodates a production room for land and underwater videotapes) are also part of the new headquarters.

Surfside Watersports is run by Rod and Penny McDowell, who also arrange the dive packages.

The new location is ideal to service cruise ship passengers who land at the port of George Town. Within a short walking distance, they can hire photographic equipment, take a dive or take advantage of the Surfside shuttle to the Beach Club, where they can choose from a variety of watersports, including Jet Skis, glassbottom boat rides, parasailing and windsurfing excursions.

Surfside Watersports is a member of the Cayman Islands Watersports Operators Association.

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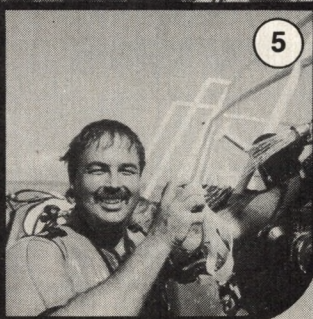
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
MOORING SYSTEM FOR SABA MARINE PARK

A marine park is being established around the tiny island of Saba, one of the Dutch Antilles, 28 miles south of St. Maarten. To facilitate diving in the marine park and to prevent anchor damage to the fragile reef corals, a system of permanent moorings has been installed.

The Saba Marine Park used a mooring design developed by John Halas of the Key Largo National Marine Sanctuary. His design has been successfully applied and tested for a good many years in the Florida Keys. The technique involves drill-




ing an 18-20 inch deep hole in the coral substrate. A stainless steel eyebolt is cemented in the hole. After hardening of the cement a polypropylene rope with a buoy and pick-up line is shackled directly to the eyebolt. No chain is needed in this setup, thus eliminating any damage to the corals in the immediate surroundings of the mooring.

Eighteen new moorings have been installed, bringing the total number in the Saba Marine Park to 26. 

LA MER'S 800 NUMBER

La Mer Diving Seafari, Inc. in New York has a new toll free number (800) DIVE-NOW (348-3669). La Mer specializes in dive travel programs for groups of six to eight guests on first class, specially equipped, live-aboard vessels around the world, including Papua New Guinea, the Solomon Islands, Maldives Islands, Galapagos Islands, Fiji Islands, Red Sea, Little Cayman, Turks and Caicos and the Great White Shark expedition. All La Mer travel operations are organized by professional tour coordinators and its packages are fully inclusive of all transfers, meals, hotel and diving activities.

For more information contact La Mer Diving Seafari, Inc. at 823 United Nations Plaza, Suite 817, New York, NY 10017 or call (800) DIVE-NOW or (212) 599-0886. 

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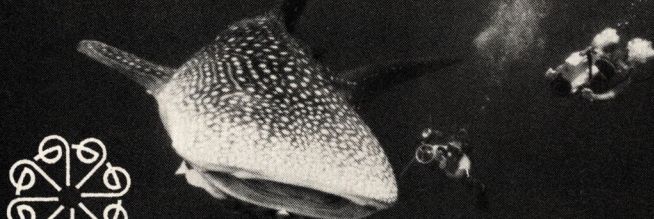


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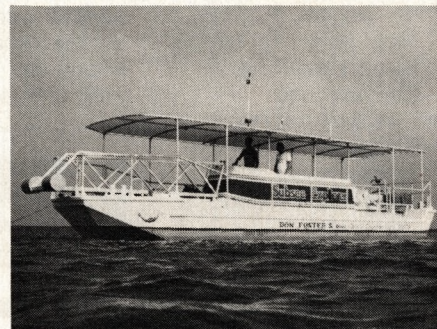
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SUBSEE EXPLORER

A unique Australian-designed and built semisubmersible craft called the *Subsee Explorer* recently made its maiden voyage as the newest addition to aquatic offerings of Don Foster's Dive Grand Cayman, Ltd. The 42 foot vessel is designed to give nondiving visitors an exciting view of tropical coral reefs while sitting in a submerged 27 passenger cabin six feet beneath the sea's surface.



The *Subsee Explorer* is the only vessel of its kind in operation outside of Queensland, Australia. Its unique design enables passengers to travel "through" coral reefs in a submerged cabin. Large, specially angled windows in the sides of the cabin give the effect of riding underwater.

During the first few months of operation, Don Foster himself will act as *Subsee's* skipper while training staff members at the helm. Regular daily trips will offer Foster's dive customers and the general public an opportunity to ride in this vessel, but its main appeal is expected to be to the many cruise ship passengers who visit Grand Cayman each week. For information contact Don Foster's Dive Grand Cayman, Ltd., P.O. Box 151, Grand Cayman, BWI (809) 949-7025 or Scuba Tours, Inc. (800) 526-1394, in NJ (201) 256-9115.

ARTIFICIAL REEF EXPERIMENT

Research scientists from the University of Miami and the National Marine Fisheries Service cooperated recently in an artificial reef experiment. Fifty reef habitats were deployed off Key Biscayne by the salvage tug *Helen B* from Byrd Commercial Diving. The habitats are prefabricated and manufactured by U.S. Precast in Miami. Each three ton module, termed a "dice block," is a 4.5 foot concrete cube with six inch thick walls. The Dade County Department of Environmental Resources Management (DERM) is providing a permitted research site and other assistance. Scientists are asking divers not to disturb organisms on these reefs during the two year experiment.

The research is funded by NMFS and Florida Sea Grant through the University of Miami.

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PADI DIVE TABLES
TABLE 1. SURFACE INTERVAL CREDIT TABLE
TABLE 2. NO DECOMPRESSION LIMITS AND GROUP DESIGNATION TABLE

The image shows two PADI dive tables. Table 1 is the Surface Interval Credit Table, which allows divers to credit previous dives towards their current dive. Table 2 is the No Decompression Limits and Group Designation Table, which provides the maximum bottom time for various depths and the resulting repetitive group designation.

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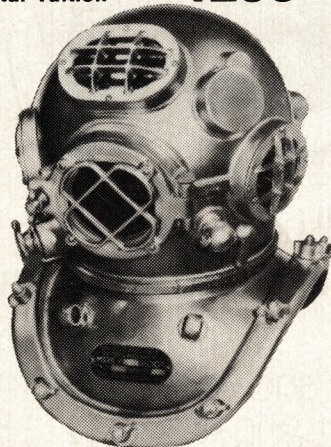
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For more information and reservations contact Go Diving, Inc., 7630 West 78th Street, Minneapolis, MN 55435; (800) 328-5285 toll free, in MN (612) 942-9687.

CURACAO SEAQUARIUM

The privately financed Curacao Seaquarium opened in 1984 at a site neighboring the underwater park and adjacent to the Princess Beach Hotel. Since that time, numerous facilities have been added, making it an ideal recreational area for the whole family. It was also recently the site of the second Curacao Open International Windsurfing Championships.

The Seaquarium displays more than 400 species of fish, crabs, anemones and other invertebrates, plus colorful sponges and corals in their natural surroundings. All species are natives of the beautiful reefs surrounding Curacao.

The most recent addition at the Seaquarium is its 450 meter long manmade beach of white sand, reclaimed from the ocean just off Curacao's coast. The breakwaters just offshore make the swimming great for novices and children and the more adventurous have easy access to snorkeling, scuba diving and windsurfing. Gypsy operates the beach snack bar. Shower and bathroom facilities are close by. A beach shop will open soon. A children's playground is now being planned. The Curacao Waterpark, between the Seaquarium and the beach, has two water slides.

The Dive Shop, managed by Chris Richards, offers rental and sale of a complete range of diving equipment and has its own compressors with the capacity to fill 1,200 scuba tanks daily. Two dive boats offer trips daily from 10:00 am-12:00 pm and from 2:00-4:00 pm. Lockers are available for divers' valuables while at sea. There is also a 25 passengers glassbottom boat that leaves the Seaquarium regularly for 45 minute trips.

In the Seaquarium complex itself there are restaurants and bars overlooking the ocean and with fantastic views of the exotic tropical sunsets. And, to round off a visit, the souvenir shop offers an assortment of attractive items.

KEYS ARTIFICIAL REEFS

Two obsolete U.S. Coast Guard cutters will soon be sunk off Molasses Reef in John Pennekamp Park to form artificial reefs. The *Bibb* and *Duane* are 330 foot vessels and they should make excellent dive sites.

The sinkings, sponsored by the Florida Keys Artificial Reef Association, were partially funded by a \$1,000 donation from PADI and other members of the diving industry including the Diving Equipment Manufacturers Association.

Ocean Divers of Key Largo was active in this program and will schedule charters to the wrecks, with wreck and deep diving specialty certifications offered.

For more information contact Ocean Divers, 522 Caribbean Drive, Key Largo, FL 33037; (800) 451-1113.

PADI COLLEGE

PADI International College has appointed Tim Grandstaff to its team of staff instructors. Grandstaff, a PADI master instructor and IDC staff instructor, has spent the past two years teaching diving and managing the scuba department at Sport Chalet, in Huntington Beach, CA.

At the college, Grandstaff will assist in teaching all phases of the gold curriculum—including the rescue diver and dive-master courses, the PADI instructor development course and the professional equipment repair course. He will also have special responsibilities during the sales and operations course, where he will teach retailing, marketing and display and head the model dive store program.

Additionally, PADI International has introduced a new gold plus curriculum—the most comprehensive instructor training program ever offered by the college. The 12 week curriculum incorporates advanced, rescue, divemaster and instructor training with a solid background in equipment repair, dive store operations and U/W photography, plus a two week practical teaching internship.

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SEATEC MOVE

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WHALE ENCOUNTER

(Continued from Page 12)

plicated than that of a simple gullible fool swimming up to pet a 40 ton leviathan. Underwater cameraman, Marty Snyderman, and I had been asked by a film production company to travel to San Ignacio Lagoon on the Pacific Coast of Baja California to film gray whales during their mating and calving season. Over breakfast, on the day Marty and I first met with the producers of the film, our employers explained they were under contract to deliver a variety of U/W scenes depicting several whale behaviors. Among these scenes, he explained, we would need to film the following: whales feeding, mating, giving birth and finally, a whale breaching. Again, all of these from an U/W perspective.

After recovering from the gasp that nearly caused me to spray my companions with a mouthful of scrambled eggs, I explained there existed several flaws in the plan. First, gray whales are extremely difficult to approach underwater and second, visibility in the lagoon ranges from 0 to 15 feet and almost never exceeds 12. An underwater cameraman would have to be within six feet of a whale, in the best of conditions, to capture clear images on film. Filming gray whales feeding would be an almost miraculous achievement. The diver would have to be in exactly the right place as a whale approached and scooped up the muddy lagoon floor within a few feet of the camera. (Gray whales generally feed on bottom dwelling crustaceans by turning on their sides and swimming across the bottom using their mouths like scoops). Capturing a whale birth would be just as miraculous. Not only must one be fortunate enough to find a whale in the process of giving birth (an event observed rarely in the lagoon), but the whale must permit the cameraman to wait in the turbid water only feet away.

Filming mating whales, I explained, would also be quite difficult since the courtship process is rather violent (involving three individuals—one female and two males). I admitted that the thought of being caught between the massive bodies of even blissfully cuddling whales made me a bit nervous.

But it was the final objective that nearly caused me to erupt like a scrambled egg volcano. Assuming that it were possible to film a gray whale leaping clear of the water from beneath the surface in ten foot visibility, I suggested that the chances of recovering the shattered remains of the movie camera (and less useful, though no less damaged, underwater cameraman) after the 40 ton beast came crashing back down, were poor owing to the miserable water visibility. The only thing an underwater photographer is likely to accomplish in San Ignacio Lagoon is film-



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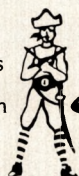


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WHALE ENCOUNTER

ing the faces of "friendly" whales as they approach to investigate the skiff, or any part of a whale that for some reason is essentially stationary.

Several weeks later, despite my negative comments concerning the underwater objectives, Marty and I found ourselves adrift in a small inflatable boat under the intense San Ignacio sun waiting for a friendly whale. A friendly whale encounter can be one of the most thrilling and beautiful experiences of a lifetime. Breathing through a snorkel while holding onto the side of the inflatable, I have watched as many as three whales at a time rolling over and over on their sides as if dancing to some strange music that only they can appreciate (sounds produced by the outboard motor). One eye of a whale would roll up to within touching distance, then it would roll down and a few seconds later I would be looking into the other eye. With each roll the pectoral fin would miss my chest by mere inches. Sometimes they would keep this up for more than an hour, pausing every few minutes to breathe. If the outboard motor was turned off, they lost interest.

While adult whales roll under the boat, the calves will sometimes spin vertically. They seem to pivot on their tails and will spin very rapidly, making nearly 60 revolutions per minute, often with their heads out of the water right alongside the boat. It was this kind of encounter that Marty and I needed in order to produce any usable underwater footage.

After two days without a friendly encounter and despite the certain knowledge that we were doing the very best we could (which unfortunately happened to be nothing at all) Marty and I began to feel guilty at our own lack of productivity. So, when three courting whales began circling 50 yards away, we decided to swim over and see how close we could get. To the great grinning glee of our producers, Marty and I donned our masks, fins and snorkels and slipped over the side with our cameras. After lowering myself feet first into the water I noticed I could see my ankles but the tips of my fins disappeared into the murk. Visibility was absolutely terrible. For a moment I considered swimming down to the bottom and filming the muddy floor from about seven feet away and then telling our producers it was the side of a sleeping whale. I doubt anyone would have known the difference.

As we swam toward the three whales we would occasionally see the enormous splashes produced by huge tail flukes as they flopped about on the surface. The whales were moving in a slow circle—slow, however, for whales, which swim much faster than a diver. I didn't seriously think we would get close to the animals.

We had tried this sort of thing many times in the past without success. The whales would either move slowly away, faster than we could swim, or they would detect us acoustically with some form of active or passive echolocation that is not yet clearly understood, and leave the area.

But this time we got "lucky." As I looked up to see where the group was, I realized they were moving rapidly our way. Where earlier I hadn't thought we had any chance of getting close enough to film these animals, I now felt a close encounter might be inevitable. Thirty yards away a large whale surfaced, blew and dived, heading right for me. I flicked the safety catch off the trigger of the camera, took three deep breaths and dived.

At about 30 feet I stopped and hung motionless—waiting. The darkness of the green water was oppressive. I hung suspended between the surface ten yards above and the muddy bottom an unknown distance below, wishing my eyes would adjust more quickly to the darkness. Had I been there to film sharks or some other large, potentially dangerous marine animals, I probably would have swum back to the boat as quickly as possible. But I was there to film whales and, despite my instincts, my mind told me whales are gentle and don't hurt people.

Suddenly, there were shadows; great ominous shadows swirling all around me and I knew that huge, rapidly moving creatures were only a few feet away. But there was no shape to the shadows. I squinted, hoping for some idea of what to do, where to point the camera, where to go. But there was no place to go and besides, I thought, this was what I was there for. I switched on the camera and pointed it in front of me (quite randomly) almost hoping that I would run out of film before anything happened so I could get the heck out of the water.

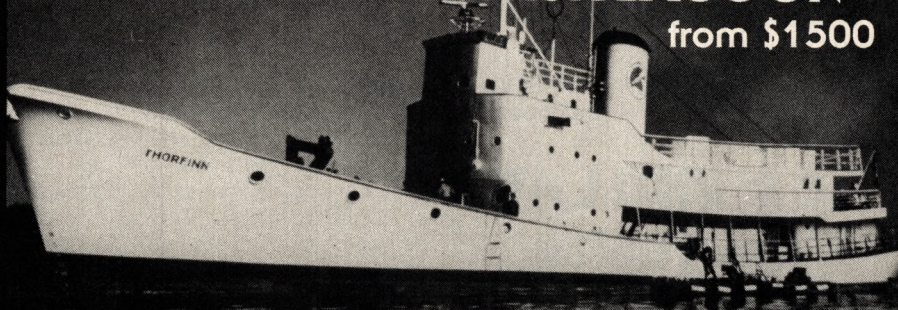
A moment later a shadow darkened and transformed itself into a huge mountain of gray flesh. It was the face of a whale and in an instant I was looking directly into the eye of a leviathan only six feet away. For a second our eyes made contact and what I saw there sent a rush of adrenalin through my system like no sight I had ever seen before. In the eye of the whale I was certain I saw fear.

After our eyes made contact I saw a discernible tremor in the whale's body as it turned and suddenly accelerated away. For perhaps two seconds I was alone, but instinctively I was certain all was not well. I felt like the mouse that had frightened the elephant, causing it to jump into the air only to be crushed as the beast came crashing down. I was curled up in a ball holding the camera close to my chest when the impact came.

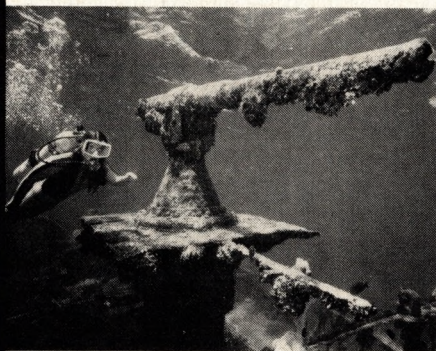
Four things happened nearly simultaneously. I saw what looked like a shining semicircular white arc of light extending from the distance in front of me to my left side (the vortex created by the flukes). At my left side I caught the fleeting image of

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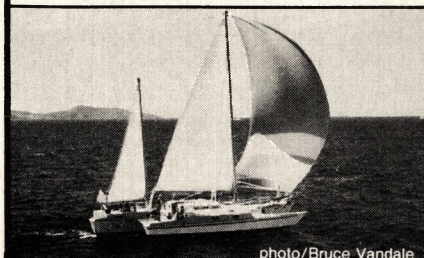
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WHALE ENCOUNTER

great flukes as they smashed into my body, edge on. In my head I heard an explosion as if a shotgun had been fired in my ear. Then the lights went out.

In a semiconscious state I managed to struggle to the surface where Marty helped me back to our boat. I had lost my mask and one glove and had acquired two broken ribs and a fractured left arm. Fortunately, I still had my camera, but only because it had been attached to my wrist with a lanyard. Within a few hours I was aboard a sportfishing boat bound for San Diego and lying in a warm, comfortable bunk quietly contemplating the effects of an excessive dose of codeine.

Looking back on the event during the following months, some things seemed to become clearer. And, I had every reason to dwell on the attack since the producers of the film informed Marty and I that we must return to the lagoon the following year to complete the project. I'm quite sure that "attack" is the proper word for the incident. Gray whales are relatively slow moving animals and are easy targets for killer whales and sharks. In the lagoon you can't help but notice that the flukes are often scalloped with angry red semicircular bites. Obviously, these injuries are inflicted by sharks in or just outside the lagoon. In either case, these predators plague the whales, making them wary of other creatures in the water nearby. To deal with this threat, the gray whales have learned to use their flukes like a gigantic karate chop, enabling them to deliver a blow with awesome power and precise accuracy.

The whale that attacked me was probably busy with its courtship activity and didn't sense my presence until we came eye to eye with each other. This sudden confrontation with an unknown creature frightened the animal and it attacked.

Certainly I cannot blame the whale. I had no business approaching the animals in such a manner and, at the time, all my instincts told me so. Had it not been for the popularization of whales as benevolent beings, I might have been less bold. I had also had several earlier U/W encounters with whales that were quite pleasant. These encounters did nothing but reinforce the "gentle giant" ideology. So, as I descended into the murky green water in San Ignacio Lagoon, my mind was telling me, it's all right, whales don't hurt people—even though my instincts didn't agree.

I also believe that if the whale had seen me either visually or with its echolocation capabilities, it simply would have avoided me. I feel that the abruptness of the confrontation, largely owing to the poor visibility, helped precipitate the attack.

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
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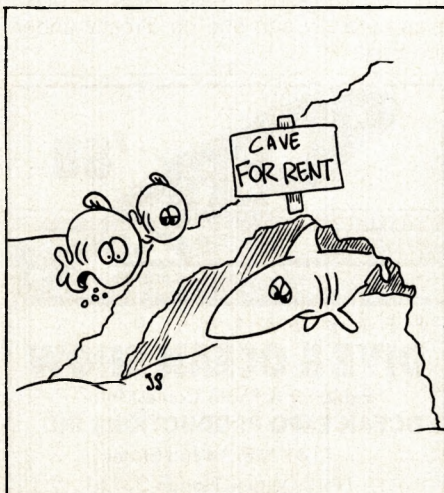
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intelligent life, the question of cetacean intelligence could not be more relevant. But, the size of the cetacean brain and the size of the human brain may be the only thing our two species have in common. Dr. Bill Evans of the Hubb's Sea-world Research Institute once told me, "Whales don't live in a different world than we do, they live in a different universe." Certainly, those huge cetacean brains must do something very complex. It is an evolutionary law that a species must use an energy expensive organ or that organ will atrophy over a period of evolutionary time. That's why the kiwi lost its ability to fly. So, something must be going on inside those huge brains to necessitate their size. But, assuming we share any common emotions or thought processes with these animals may be naive. And, if their thought processes and emotions are entirely alien to us, we must have thought processes and emotions that are equally alien to them. Therefore, in any measure of intelligence we may devise, cetaceans must fall short of human capability. But, regardless of what may be going on inside the brain of these wonderful creatures, it should be remembered that they are animals that have evolved in what was, and remains, an often brutal environment.

There is one final addendum to my unpleasant encounter in San Ignacio Lagoon that I am reminded of too often. When the film was developed and projected in the weeks that followed, the image of an enormous pink organ 12 feet long appeared on the screen! Neither Marty nor I was quick to claim credit for the image since neither of us remembered seeing such a thing underwater (and, of course, it would have been difficult to forget). But our producers were quite beside themselves with pleasure. This was whale mating underwater—a first! It was subsequently decided that the scene was mine and that I had done my very best underwater film work while unconscious with a camera dangling from a lanyard at my wrist. 



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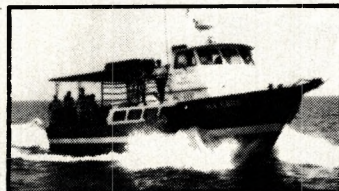


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DIGITEK CONSOLE

(Continued from Page 54)

previous dive information from the scrolling memory so be sure you've entered it in your dive log.)

Auto Backlighting: The Digitek incorporates an automatic light sensing circuit that turns on an electroluminescent backlight when the ambient light drops below a readable threshold. The displays glow white, placing the numerals and pictographs in sharp contrast. Backlighting is useful on night dives, interior wreck dives and in other low light level situations.

WHAT DIGITEK DOES NOT DO

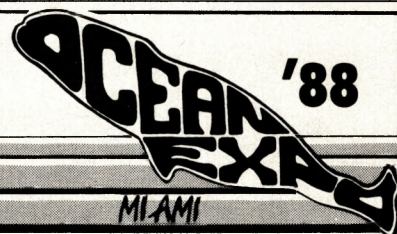
While the Digitek is a computer that provides 19 automatic functions, it should not be confused with a no-decompression or decompression dive computer. It is basically an all digital dive console, and a highly sophisticated one, intended for the diver who never expects to get near his or her no-decompression limits.

If you are seeking a full dive computer, including decompression capability, you may wish to wait for Tekna's Computek. It will be similar in design but will include the new U.S. Navy multilevel decompression tables and displays.

CONCLUSION

During open water test dives, we found the Digitek displays to be exceptionally bright and easy to read. We also found the Digitek to be highly accurate when compared to other digital and analog diving instruments. Depths, times, temperatures and tank pressures were always right on the button.

From a safety point of view, we were especially impressed with both the Remaining Air Time display and a flashing warning indicator for low air pressure. It is virtually impossible to ignore this brightly blinking LCD screen that depicts a scuba tank almost depleted. The Remaining Air Display really helps the diver plan carefully and end up directly under the boat.



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FOR MORE INFORMATION

The Digitek retails for \$425. Additional Tekna 2/3 A lithium batteries sell for \$6.95. For more information on the Digitek, drop by your local Tekna dive store dealer or contact Tekna, 101 Twin Dolphin Drive, Redwood City, CA 94065-1086.

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
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
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CALIFORNIA PHOTO COMPETITION


The Channel Islands Underwater Photographic Society is sponsoring its second annual California Underwater Photographic Competition. Underwater photographers from around the world are invited to enter prints and slides taken in California. There will be both an open and novice division. This year's competition will also feature a video category.

The entry deadline is February 5, 1988. Winning entries will be exhibited at the Channel Islands Underwater Photographic Society's fourth annual film show, to be held at the Port Hueneme Cultural Center February 27. Further details and competition rules can be obtained from the competition chairman, Jim Perry, Channel Islands U/W Photographic Society, P.O. Box 6901, Oxnard, CA 93031. 

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SOUTH SEAS CATAMARAN

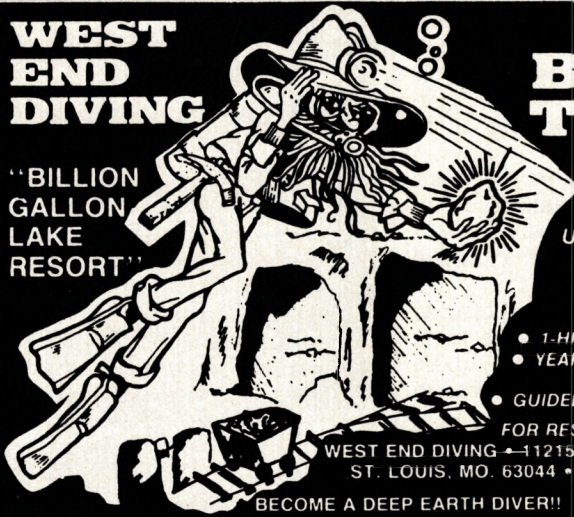
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zona couple was honeymooning on Grand Cayman when they became the first tourists to dive to such a depth with RSL. Mark, an engineer with Garrett Turbine Engine Company, likened the scenery at 2,000 feet to a "lunar landscape." Nicola, a research scientist with the Genetics Center in Phoenix, Arizona said, "I wouldn't have realized we had been down for so long if I hadn't had a watch—there was so much to see!"

The two passenger *Pisces II*, one of ten such submarines, is 20 feet long, weighs 12 tons and has two externally mounted cameras, sonar and two mechanically manipulated arms, which collect objects and place them into a metal basket. 🐠

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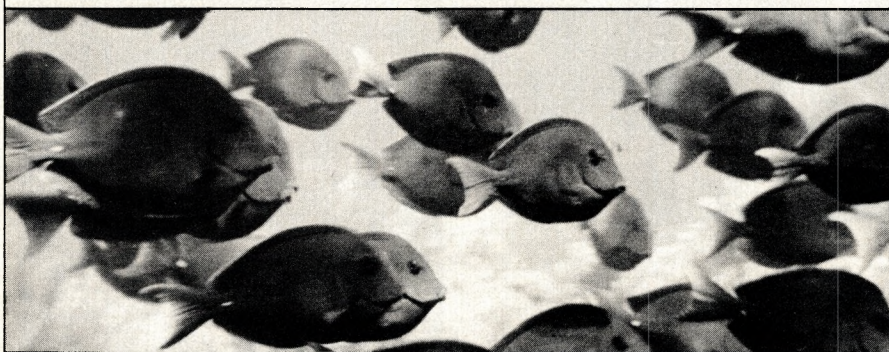


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TABATA BCJ LIBERATE YOURSELF FROM HASSLE

TEXT AND PHOTOGRAPHY
BY BONNIE J. CARDONE



Tabata's line of Liberator dive gear, so named because it "liberates" the user from hassle, includes the BCJ-100 series. Among its liberating features are shoulder straps with quick release buckles.

This year Tabata USA introduced an entire line of Liberator dive gear, so named because it "liberates" the user from hassle. These items include masks, fins, knives, consoles, regulators and the Liberator BCJ-101.

About now you are probably asking yourself how a buoyancy compensator could "liberate" you. Let us count the ways. First of all, the Tusa jacket has shoulder straps with quick release buckles. These make getting into and out of it easy: Unsnap the buckles to put the jacket on (no more trying to slip gauge clad arms through unyielding straps) and to take it off. Neoprene sleeves slip over the buckles to help prevent them from opening accidentally. The shoulder straps have sturdy plastic D-rings on the ends that allow personalized adjustment. Pull down until the jacket fits just as snugly as you desire.

The second liberating feature of the BCJ-101 is its lack of an inner bladder. Some BCs have inner bladders made of

thin plastic and, if you are careless about rinsing them with freshwater after an ocean dive, they can be punctured by the salt crystals that result. Patching may be ineffective in such cases, which means the entire bladder has to be replaced. This isn't hard, but it will take time and cost money. Because the BCJ-101 has only a sturdy single bladder, laminated on the inside with .55mm PVC, salt crystals should not be a problem. Although this Tusa jacket is baffled to keep air distributed evenly, it has no inner chambers. This means air can't get trapped when you're trying to dump it during a dive and water can't get trapped when you're rinsing it out. Since we're discussing rinsing



The BCJ-101 has a Velcro closing cummerbund and two chest straps with quick release buckles to provide a custom fit.

the jacket out, it should be noted that this is extremely simple with the Liberator. Both the dump valve on the left shoulder and the cap for the stubbed CO₂ mechanism under the left pocket unscrew, allowing you to rinse it thoroughly.

A third liberating feature of the BCJ-101 is its cummerbund. It closes with Velcro for snug adjustments and is designed to distribute the weight of the tank at the waist, alleviating shoulder strain.

Yet another liberating feature of this Tusa jacket is the specially designed left hand pocket. It has a Velcro closing flap as well as a vertical slit that closes with Velcro. Tuck your octopus in the slit and close it: You never need wonder where your extra second stage is. This system also prevents the octopus from dragging along on the bottom and picking up sand and debris. Both the left and the right pockets have mesh panels that allow water to drain.

The Liberator has a lot of other features divers expect to find in a buoyancy control jacket such as: a dump/overpressure relief valve activated by pulling down on the corrugated manual inflation hose; a power inflator; two waist straps with quick

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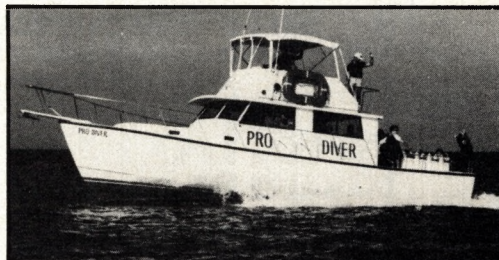
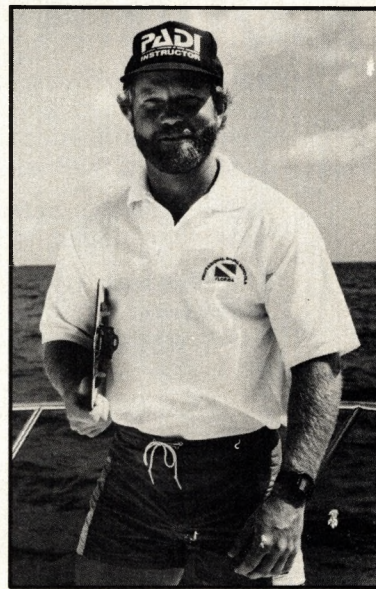
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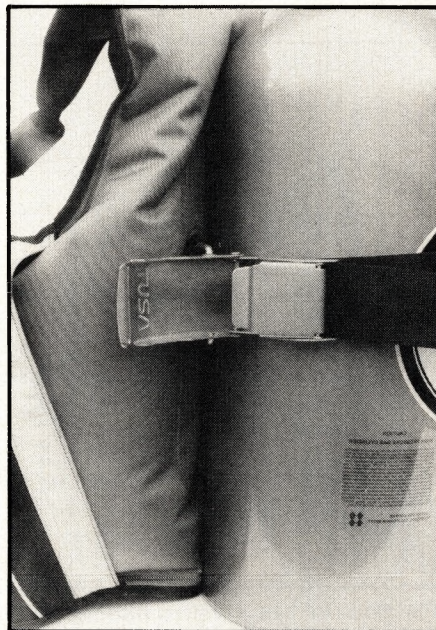
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LIBERATOR

release buckles; and four plastic D-rings for attaching accessories. The integrated backpack has rubber inserts to prevent tank slippage. The tank band has a newly designed stainless steel buckle that's easier to thread and a rubber sleeve that should also help prevent tank slippage.

The Liberator jacket bladder is 100 percent polyester, which is light and fast drying. It comes in charcoal and black with either blue/silver, yellow/silver or



The tank band is nylon webbing with a rubber sleeve to prevent slippage. The new stainless steel buckle is easier to thread than those formerly used on Tusa BCs.

pink/silver accent stripes. BCJ-101 designates the small, medium and large sizes with blue stripes; the BCJ-111 is all three sizes with yellow; and the BCJ-121 is the small and medium sizes with pink stripes. The Liberator retails for \$395. How liberated can you be? See your Tataba USA dealer and find out!



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The Underwater Explorers Society (UNEXSO) of Freeport, Grand Bahama successfully conducted its first High Arctic Dive Safari May 9-23, 1987. UNEXSO's president, John Englander, said, "It was an incredible adventure; the trip went extremely well."

Seven divers accompanied Englander. They met in Toronto for two days of preparation, renting drysuits and a practice dive. Then it was a six and one-half hour flight from Toronto northward to Resolute, Northwest Territories, Canada, 2,300 miles north of Toronto.

During their time in the High Arctic, the group traveled nearly 500 miles by snowmobile, camped on the ice in tents, and got a special perspective on a unique part of the world. UNEXSO arranged for three Inuit (Eskimo) guides to work with the group.

Dives were made through 10 feet of ice, in 29°F water. Visibility was more than 100 feet. The northernmost dive was at latitude 76° 09' north, just more than 800 miles from the true North Pole.

In testimony to the success of the trip, most participants have indicated they would like to return next year.

For further information, contact UNEXSO, P.O. Box F-2433, Freeport, Bahamas, or phone (305) 761-7679; toll free except Florida (800) 992-DIVE.

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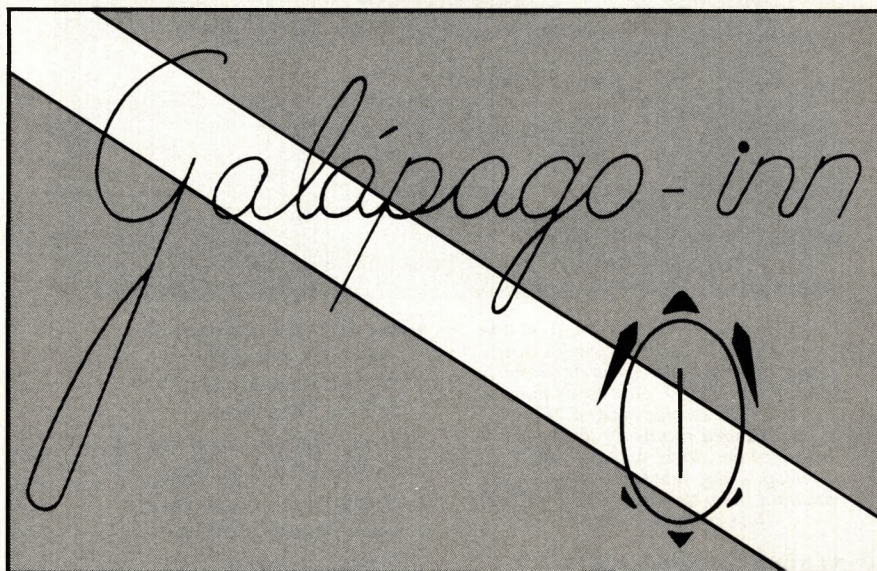
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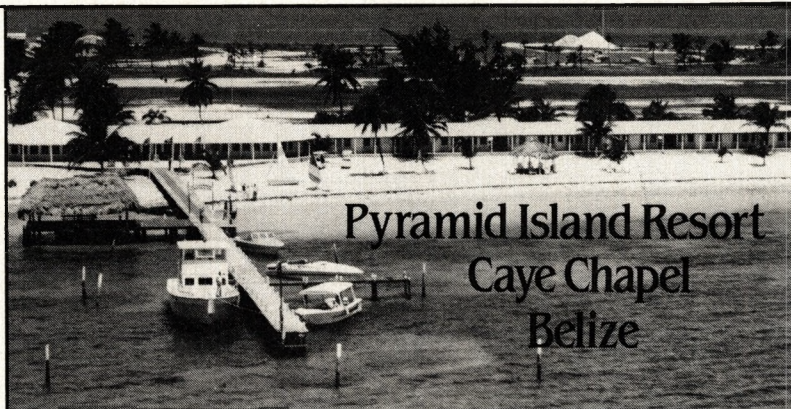
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TECHNIFACTS

(Continued from Page 49)

extreme change in the environment should warn divers there have been some changes in the water.

INTAKE PIPELINES

The principal hazard in diving around an intake line is the violent flow of water into the line and not pollution. Generally there are no screens over the ends of the intake pipelines. Inlets to these lines are usually installed closer to shore in shallower water than an effluent discharge line. They may be any size from 1 foot to 16 to 20 feet in diameter, depending on the size of the industrial plant and its cooling water needs. An alert diver in the vicinity of an intake pipeline should notice a change in the direction and speed of currents before the intake flow becomes a hazard. It is best to ascertain the location of any intake lines in a diving area and avoid them completely.

Both outfalls and intakes are found at dams and in association with navigation locks used in transiting vessels. Waters in the vicinity of dams and navigation locks are restricted areas and must be avoided by divers.

HULL SCRUBBING BY DIVERS

Scrubbing hulls of vessels of all sizes is usually a job for commercial divers. Infrequently, sport divers undertake hull cleaning on smaller vessels. Commercial divers engage in this work while outfitted with drysuits and full facemasks. They are completely insulated from the water and suspended pollutants from the possibly toxic paint. All hull paints help keep a vessel clean by poisoning marine life and many of the chemicals in the paint are potentially hazardous to a diver's health. An additional word of caution: Some of the marine life, particularly the hydroids sometimes found on hulls, are, in themselves, toxic to humans to a greater or lesser extent. A sport diver who wishes to engage in hull cleaning should use a drysuit and full facemask.

DIVERS AND HOT WATER

Diving in overly hot water causes fatigue early. The term "hot water" may be misleading. For water to be a potential threat to sport divers the temperature should be above 80°F. Sport divers who usually plan their dive profiles for lower water temperatures may find the same plan too exhausting in warmer water.

Sites with excessive water temperature may be encountered in the vicinity of some outfall pipelines. Usually these are associated with power generating plants, refineries, chemical plants or other industrial installation requiring large volumes of cooling water that is discharged back into the aquatic environment.

RADIOACTIVE WATERS

There is little chance that a sport diver will encounter radioactive water except, possibly, in diving some of the Pacific atolls where vessels from atom bomb tests have been disposed of by sinking. Probably most, perhaps all, vessels used in tests are now radioactively safe. It is suggested divers check with officials in charge of disposal areas prior to diving on any sunken target vessels.

RESCUE AND RECOVERY

Water is everywhere. Wherever there is water there are tragic incidents of drownings or near drownings. Some are victims of accidents. Others are suicides. Whenever such tragedies occur, a great deal of community pressure is put on sport divers living in the area to attempt a rescue or recovery of the victim. Regardless of how much sport diving experience a diver has, rescue and recovery puts demands on an individual far beyond what is normally anticipated. Frequently, sport diver efforts to rescue or recover a victim end in failure. The adverse psychological effects on divers who have "failed" in efforts for which they were not adequately trained or equipped are sometimes traumatic.

Finally, in this day of highly contagious diseases in a growing number of the population, particularly in suicide cases, inadequately trained and improperly equipped sport divers are subjecting themselves to possible exposure of potentially fatal diseases. Unless sport divers have been adequately trained and properly equipped for search, rescue and recovery, they should decline to engage in this kind of diving.

An organization known as Dive Rescue International Incorporated—2619 Canton Court, Fort Collins, CO 80525; (303) 482-0887—has several training programs available for advanced sport divers. Some of the courses are Water Accident Management, Dive Rescue I, Underwater Investigator, Dive Rescue II, Ice Rescue and Diving in Polluted Water. Sport divers should write to Dive Rescue at the above address for additional information.

Two books are available that will appeal to sport divers interested in community service rescue and recovery diving. They are *Dive Rescue Specialist Training Manual* and *Adventures in Underwater Rescue*. Both are available from Dive Rescue International Inc. at the address listed previously. This same company has a catalogue titled *Equipment and Training Guide* listing advanced equipment for use by public service rescue and recovery divers.

SPORT DIVING EQUIPMENT FOR POLLUTED WATER

Some diving equipment used by sport divers can produce an increased threat of contamination when used in polluted water. The two principal items are the

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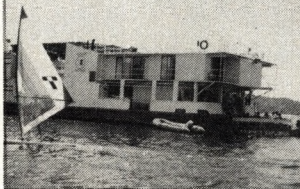
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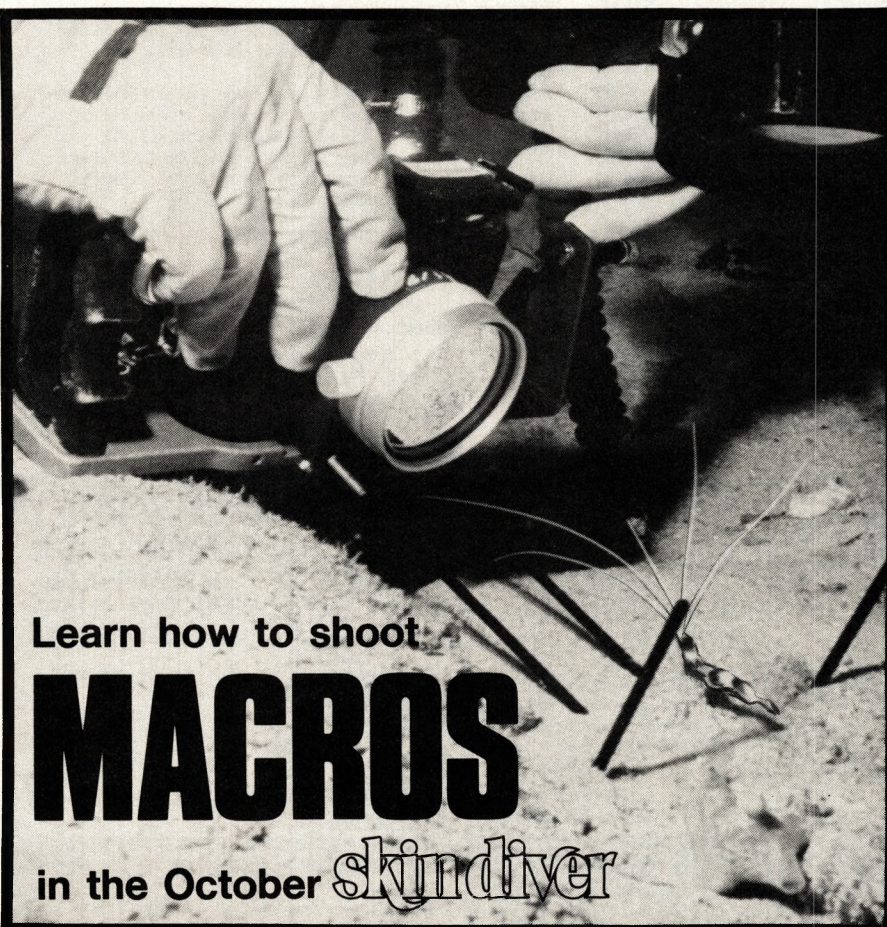
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in the October *skindiver*

TECHNIFACTS

wetsuit (or even worse, no suit at all) and the conventional regulator utilizing a mouthpiece. Wetsuits allow complete contact with any water in which the wearer is swimming and, if in polluted water, the pollutants also come in contact with the diver's skin.

The regulator mouthpiece is gripped rather loosely in the diver's mouth during a dive. Water frequently finds its way into the mouth and, eventually, some is swallowed or inhaled during the dive. Boots and gloves are frequently not worn by sport divers and bare feet and hands are exposed directly to the water. Any cuts or scrapes on any part of the diver's body compound the possibility of adverse effects from waterborne contaminants.

It is suggested that divers who wish to dive in potentially polluted water; who might accidentally enter areas of contamination; or who engage in underwater activities that lead to water contamination—such as scrubbing a boat hull covered with antifouling paint—should wear drysuits with attached boots and a full face-mask adapted to their regulator. Protective gloves should also be worn.

FINAL THOUGHTS


I would like first to extend my thanks to Steven J. Linton, president, and the staff of Dive Rescue Inc./International for providing information on equipment and techniques for safely working in potentially hazardous waters.

Secondly, it seems to me a rewarding project for individual divers throughout the world would be to compile a list of areas believed to be contaminated by pollutants. Personal experience, newspaper and magazine articles, special reports and discussions among divers would be sources for this information.

If this data were relayed to local clubs or diving associations for compiling and publishing, divers would soon have a list of areas to be avoided.

Technifacts would like to hear from divers regarding any experiences they have had with contaminated water of any kind—also the location of such areas. Write to Technifacts, c/o SKIN DIVER Magazine, 8490 Sunset Boulevard, Los Angeles, CA 90069.

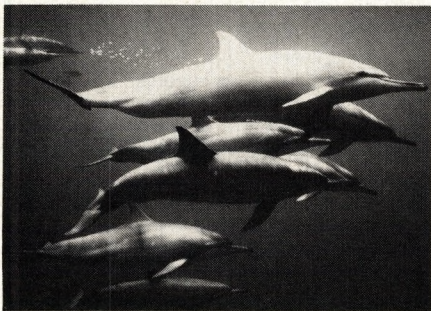
Next month, be with us for an introduction to navigational charts and how to use them for planning dive safety and to enhance the result of almost any dive. Learn how to find underwater pipelines, wrecks, areas of strong currents, kelp, deep and shallow water, and a great deal of other information. Charts are extremely useful tools for dive safety and enjoyment and they are some of the least expensive of all kinds of maps.

See you then. 

BAY OF DOLPHINS AWARD

Underwater film producer Jack McKenney has received the prestigious Golden Eagle for his latest film, *The Bay of Dolphins*. The award was given by the Council on International Non-theatrical Events (CINE) at its annual awards ceremonies in Washington, D.C. Professional juries selected *The Bay of Dolphins* as an excellent production in the 16mm documentary category, deeming it eligible to represent the United States in future international film/videotape festivals.

McKenney shot the award winning film last year at the remote Fernando de Noronha archipelago off the coast of Brazil. *The Bay of Dolphins* was produced to convince the Brazilian government to set aside a portion of the remote archipelago as a marine preserve. Vast schools of spinner dolphins were first observed there around 1700 by a French expedi-



tion. It's assumed the dolphins have inhabited these waters for thousands of years. Preservation efforts are on course and park status should be granted late in 1987 or early in 1988. Russell Coffin, prime mover behind the conservation effort, was executive producer of the film. >

NAUI ACCREDITED COLLEGE

Sam Jackson, executive director of NAUI headquarters, and Jim Hicks, president of NAUI College, announced the immediate addition of "Accredited" to the NAUI College title, reflecting the increased development of both headquarters certification procedures and continuing sophistication of the college's career programs. The college, specializing in career training for sport diving professionals, is in its tenth year of operation in Southern California.

NAUI Accredited College offers more than professional career training. Short term courses of one and two weeks, as well as weekends, are available in rescue training, divemaster and instructor training courses. Schedules are available at no charge from the college offices. For more information contact NAUI Accredited College, 27402 Camino Capistrano, Suite 103, Laguna Niguel, CA 92677; or call toll free (800) 423-7075 or (800) 227-6663 in California. >

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LINGCOD

(Continued from Page 44)

low behind him, carrying a stringer of fish. Every now and then he would double back to spear the ling that was following her! This went on for several years until she found out who was being used as bait. For the sake of marital bliss, he gave up this technique.

POACHED LINGCOD

- 1 small onion, sliced
- 1 bay leaf
- 1 sprig parsley
- ¼ stalk celery, diced
- 3 peppercorns
- 1 tsp. salt
- ¼ tsp. tarragon
- 1 C dry white wine
- Water to cover fish
- 2 lingcod fillets

Combine all of the ingredients except for the fish in a pan and simmer for 20 minutes. Add the fish and simmer for another 8-12 minutes, until the fish becomes flaky. Ladle the fish out onto a serving platter, being careful not to break it apart. Poaching the fish on a layer of cheesecloth makes it easy to remove from the pan in one piece.

JOE'S FISH CIOPPINO

- 3 tsp. olive oil
- 1 medium onion, chopped
- 2 cloves garlic, chopped
- 3 celery stalks, chopped
- 1 large can peeled tomatoes
- 1 small can tomato paste
- 1½ C dry white wine
- ½ C fresh parsley or 3 tsp. dry parsley
- ¼ tsp. sweet basil
- 1 tsp. oregano
- 1 bay leaf
- Salt and pepper to taste
- 2 lbs. lingcod fillets, cubed

Sauté the first four ingredients until the onions are translucent and the celery is tender. Add the remaining ingredients except for the fish and simmer for about one hour until the mixture thickens to the desired consistency. Add the cubed fish and cook for an additional one-half hour.

Once a fish is spotted, move slowly toward it. Generally, it is best to approach from a glancing direction rather than to head directly toward the fish. Avoid direct eye contact. The idea is for the diver not to appear as a predator and to give the fish the illusion it is invisible. When in range you can turn and fire. Very often, even with a sloppy approach, the lingcod will hold its ground. This could be because it thinks it can't be seen, but more likely it is because the fish has yet to meet a predator bigger and meaner than itself. Since lings can live to be more than 10


years old, the big ones have had plenty of opportunity to be toughened by the reality of survival.

It is generally best to aim behind the head in such a way as to sever the spinal cord. Trying to bring in a big ling with a misplaced bodyshot is like trying to hold on to a Brahman bull by the horns. Sometimes a direct shot, right between the eyes, can be an effective way to bag a big one, but the shot must be well placed to avoid a glancing blow.

In California, there is no closed season for lingcod. A total of five fish may be possessed but they must be at least 22 inches in total length. Laws do change from time to time and vary from state to state so consult the most recent local regulations before taking any game.

Lingcod make a tasty meal, indeed. They have mild flavor with a wonderful firm, flaky texture that will stand up to a wide variety of recipes. When cleaning lingcod for the first time, many folks take notice of the color of the meat—a pale green. Not to worry, this color quickly fades to white upon cooking.

Small lings are normally filleted, while the larger ones can be cut into steaks. There is no need to worry about the bones from a big one as they are quite large. Lingcod are most frequently served either grilled or battered and pan fried. Both of these methods accentuate the mild flavor and texture of this fish. Poached lingcod is a little more involved but adds subtle flavors to blend with and enhance those of the fish. A hearty fish cioppino is a welcome treat after a day of diving in the cold Pacific and shows the versatility of this tasty fish. The recipe given here is a scaled down version of the one developed by Joe Jacklevick of the Vaqueros del Mar Skin Diving Club, Livermore, California. Joe is a NAUI instructor and serves as chief cook at club/class outings and normally prepares cioppino for 50 or so hungry divers.

If you need an excuse to head out and play in the water on a bright, sunny day, spearfishing certainly provides a good one. The fresh air, exercise and thrill of the hunt should satisfy you, but if they don't, a gourmet dinner of fresh lingcod surely will. 

FRESHWATER PHOTOS

(Continued from Page 43)

there's still the problem of backscatter and extreme side lighting is necessary. Using a narrow beam strobe will also help. A wide angle strobe can be taped off with electrician's tape to reduce the angle of coverage. Lighting just the subject will greatly reduce backscatter.

Approaching larger gamefish such as bass, pike and perch is a little more challenging. You usually need to lure them in with live bait. Minnows and crayfish work well with most species. The macro lens on a housed camera or an auxiliary lens

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YAMAHA 25

(Continued from Page 38)

cations on the motor. Corrosive forces are drawn to these anodes first, dissolving the zinc instead of the motor. Yamaha places more anodes on its motors than any other manufacturer, resulting in the sacrifice of the zinc rather than your bank account. In addition, Yamaha's screws and bolts are either stainless steel or are specially treated for corrosion resistance. Components that will be exposed to moisture are waterproofed. And, an ingeniously designed air intake helps prevent moisture from entering the engine.

Another feature on the 25 is shallow water drive. That enables the boat operator to manually raise the motor high enough to prevent scraping bottom in shallow water, while continuing to maintain propulsion.

YAMAHA 25

Engine type.....	2 cylinder, 2 stroke
Displacement.....	496 cc (30.27 cu. in.)
Bore and stroke.....	72 x 61mm (2.83 x 2.40")
Prop horsepower.....	25 hp @ 5,500 rpm
Rpm range.....	4,500-5,500
Compression ratio.....	7.0:1
Carburetors.....	One
Lubrication.....	100:1 premix
Special features.....	Loop charged induction, capacitive discharge ignition, through-prop exhaust
Shaft length.....	15 or 20"
Weight.....	114 lbs.
Warranty.....	Two years
List price.....	\$2,316

Our test motor was attached to a 14 foot Achilles inflatable from Port-a-Marine in Costa Mesa, California. We ran it off the coast of Laguna Beach—with three divers on board and six tanks—heading uphill into some nasty chop. The combination was close to the capacity limits of this engine. At first we moved the passengers forward to get on a plane, but that proved unnecessary. Given enough time, the motor did it by itself. On a few occasions we had to back off momentarily from some of the larger swells, but when opening it up again, the Yamaha 25 brought us right back up on a plane. The motor handled going downhill on the way home with ease.

Many divers buy motors too large for their boats, paying for horsepower they never use. On a skiff or a small inflatable boat in the 12 to 13 foot range, the priorities in outboard motors are compactness and light weight first and power second. You want enough power to get a boat loaded with two or three divers and their gear up on a plane, but the reason you bought a small boat was for portability. Since the 25 handled our three large divers in difficult conditions, there should be




A word for the wise: "enough."

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
no problems in a smaller boat with a lesser load. If that fits within your parameters, this motor could be an excellent choice as a power source for your dive machine. 

FRESHWATER PHOTOS

on a Nikonos works well for these subjects. Having the camera preset is critical, since most action by feeding fish will be fast and furious. An assistant to feed the fish is helpful. With larger subjects it's even more important to reduce the effects of backscatter, since you have more water and hence more suspended particles between the camera and the subject. Again, use extreme side lighting and use the strobe on low power. Backscatter will also be reduced if the strobe is balanced with the ambient light. If open water is behind the subject, aiming the camera up slightly will give you a lighter and more realistic looking background.

In order to photograph divers in limited visibility, a very wide lens is essential. The Nikonos 15 or the 16mm Nikkor full-frame fisheye for the housed Nikon, if used at a distance of one to three feet, can yield good diver portraits. Brief the model beforehand and carry a slate for underwater communication. Photographs that imply some action are more visually exciting. Have your models use props such as hand lights, slave strobes, cameras or spearguns. These items, along with colorful wetsuits, can be used to add much needed color to the otherwise drab green-brown water. Interest can be added by framing divers with rocks, cave entrances or portholes. Another option is to shoot silhouettes of the diver or divers. Shoot these with the diver between you and the sun. Keep the diver shallow and good photographs are almost guaranteed, even in the murkiest of water.

Bass fishing is big business. In certain parts of the country \$15,000 "bass rigs" fill the lakes on weekends. Magazines and TV shows are devoted to the pursuit of the largemouth bass. Taking photos from the bass' point of view can be a lot of fun. A hooked fish photographed just below the surface gives a distorted, although interesting perspective of the angler in action. An extreme wide angle lens is needed to include both the fish and the fisherman. In most cases the fish will need to be about one foot from the lens, since it is the main subject and needs to fill a good portion of the frame. Warmer colors—reds, oranges and yellows—can be added to the photo with the angler's clothes, hat or with the fishing lure used.

"Take photographs in a lake, why?" For fun, because it's a challenge and because you can get good photos. Remember the four general guidelines: (1) Get in as close as possible. (2) Use side lighting. (3) Use minimal strobe lighting. (4) Point the camera up slightly. 

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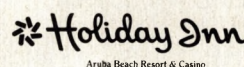
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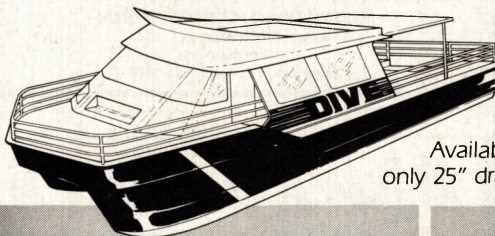
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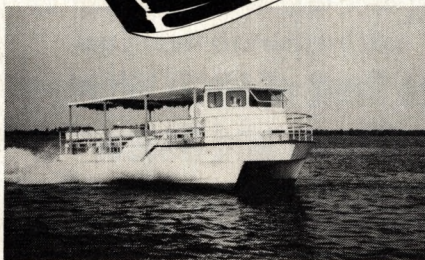
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WRECK FACTS

(Continued from Page 14)

But Gentile will not be denied his rights. He has sued NOAA in the United States District Court, challenging the decision of its officials to deny him a permit to dive the *Monitor*. Gentile is the first individual to apply for a permit to dive in the *Monitor* Marine Sanctuary; all previous applicants have been connected to scientific or educational institutions.


Gentile says the whole situation is akin to surrounding a national treasure with an impenetrable barrier and barring the public from any responsible access whatsoever. Peter E. Hess, attorney for the plaintiff, says that by virtue of the *Monitor*'s location in international waters, NOAA's permit requirements are applicable only to United States citizens. Gentile wryly adds: "The *Monitor* is a shipwreck of great historical significance to the American people, but I think it's a shame that in order to behold the aura of his own national heritage, an American must first renounce his citizenship!"

Treasure off the coast of Oregon? Yes, claims Jim McCanna from Portland. He is trying to find sunken treasure off Oswald West State Park on the Oregon coast, 10 miles south of Cannon Beach. But first he must obtain a "treasure trove" permit from the Oregon Land Board since the gold laden vessel is purported to have sunk on state property. Under the treasure trove law, the state would take possession of whatever might be found, giving the finder the first \$5,000 for expenses and a finder's fee of not more than 25 percent of the cache's face value. Larry Gilmore, curator of the Columbia River Maritime Museum in Astoria, says various legends have fueled speculation about treasure wrecks along the coastal area McCanna plans to dive.

Two new books on submarines have surfaced recently, both appealing to the historical and functional pursuits of divers. Henry Keatts' book, *Field Reference to Sunken U-boats*, lists every U-boat lost in both world wars. It includes the U-boat types, commanders, dates of demise, causes of sinkings and latitude/longitude locations. The 85 page paperback is available from Fathom Press, P.O. Box 191, Eastport, NY 11941. The price is \$5.50 plus \$1 postage.

Another U-boat historian, Ed Caram, has published a 105 page paperback all about the *U-352*, sunk in 100 feet of water off North Carolina. This book is the culmination of five years of research and travel by Caram who collected hundreds of photos and drawings of the submarine and its crew. He has included 114 photos and numerous historical facts in his book, *U-352—The Sunken German U-boat in the Graveyard of the Atlantic*. The book is

available from Ed Caram, P.O. Box 178, Jacksonville, NC 28540. The price is \$11.95, including postage.

Safe diving to all. Be sure to include a stamped, self-addressed envelope when writing: Ellsworth Boyd, 1120 Bernoudy Road, White Hall, MD 21161. 

STINGRAY CITY

(Continued from Page 27)


certainly fun to photograph. If there was more than one dive group in the water at the same time, the amazing rays would parade across the sand bottom, two abreast, moving from one group to another. They would circle a new group like the Indians at Custer's Last Stand, flying in very tight turns. Quite often, a single large ray would hover directly over a diver's head, appearing much like a stylish Mexican sombrero.

The beginnings of Stingray City date back to the early days of Grand Cayman. For many years, Cayman fishermen would come in from the sea through the North Wall channel and anchor in the calm lagoon just behind the barrier reef. Here they would clean their catch, tossing the scraps overboard. While the first food encounters were accidental, the stingrays soon learned the connection between the anchored boats and food. Many of today's rays were probably born into this unique environment.

Early in the summer of 1986, the feeding pattern of these stingrays was discovered by divemaster and dive boat skipper, Pat Kenney. He had begun operating a regular schedule of North Wall dive trips that departed from Governor's Harbour and passed through the barrier reef channel. After the morning wall dive, Captain Pat would come back through the channel and anchor in the lee of the barrier reef, just as the Cayman fishermen had done for years.

He soon noticed the rays were exceptionally responsive to his presence and he began experimenting with feeding them. Over the months, Pat has actually trained these creatures to accept food from a diver's hand and be stroked, scratched and petted like the family dog. He has many anecdotes about his encounters with these creatures.

Since then, word of Stingray City has spread like wildfire through the diving community. It has become the new mecca for celebrated underwater photographers such as Carl Roessler, Jack McKenney, Rick Frehsee, Stephen Frink and many others.

Meanwhile, Captain Pat still visits his friends four times a week, making regularly scheduled North Wall dives on Mondays, Tuesdays, Wednesdays and Fridays. There is hardly a guest aboard the *Paradise Diver* who doesn't enjoy the exhilarating experience of meeting these wonderful creatures. And, everyone agrees, "It's the world's best 12 foot dive!" 

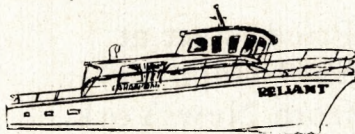
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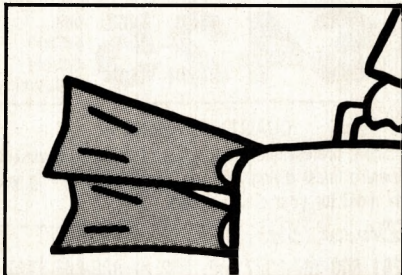
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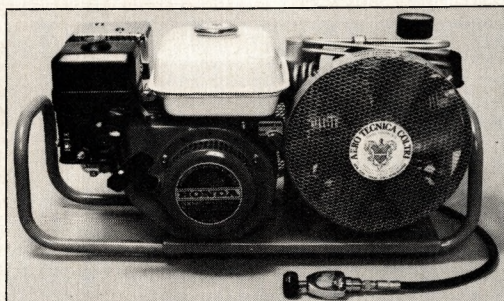
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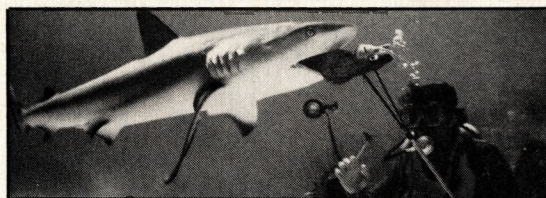
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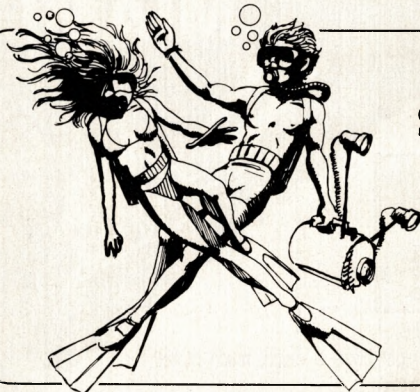
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HYPERTECH VIDEO

(Continued from Page 46)

one inch video, but of course that's very expensive. The next best thing, when shooting strictly television format, is to shoot three-quarter inch or one-half inch Betacam. Again, these cameras are very expensive, costing \$20,000-\$30,000.

When I saw the first material I shot with my inexpensive consumer RCA camcorder, however, I was pretty impressed with the picture quality. And, my CLR 200 model is an older tube camera rather than the new chip system. Guy Pelland, a videographer in Grand Cayman who works for Bob Soto's, has the new RCA chip camcorder in a Hypertech housing and the color he obtains with it is absolutely superb.

Hypertech has tested about one dozen



photos/Jim Cooluris

The Hypertech U/W video housing is compact and easy to handle while diving.

different wide angle lens adapters and found that different cameras sometimes require different lens adapters for best results. The adapter simply screws onto the end of the standard camera lens and provides a wide angle field of view of at least 80 degrees. Depth of field obviously increases tremendously. Tests I shot showed everything in focus from the dome port to infinity.

A salmon colored corrective filter is recommended when shooting in blue water deeper than 10 feet. The filter helps to hold back some of the blues and greens of the color spectrum and let more of the reds, oranges and yellows through. Both the filter and wide angle lens adapters are available from Hypertech.

An even better way to achieve great color saturation, however, is with Hypertech's underwater lights. Four models are available: The Hyper-Light V provides 100 watts of light from a six amp battery and burns for 25 minutes. The Hyperlite VI allows from 100 to 300 watts of light from a 10 amp battery, and provides 45 minutes burn time when set on the 100 watt setting; 22 minutes at 200 watts; and 14 minutes at 300 watts.

The VI model has three 100 watt bulbs in the lamp head. Two switches allow any combination of bulbs—from one to three—to be utilized. If one burns out, there are still two left. For most video ap-

plications 200 watts of light will suffice. The bulbs are rated for 50 hours and the color temperature is 3,300° Kelvin, ideal for shooting video underwater. The light head is machined from a solid block of high density white plastic.

Most underwater lights use a parabolic reflector that causes the light rays to converge at the center. This sometimes creates an uneven concentration of light. Hypertech has developed a special cone reflector that directs the light rays very evenly at a wide angle covering approximately 110 degrees.

Gel cells rather than nickel-cadmium batteries are used and charging time is four to five hours. Hypertech decided to use gel cells because, unlike nickel-cadmium batteries, they don't take a memory set, and if shorted out they aren't permanently put out of commission.

The Hyper-Light II and III are the larger models, providing longer burn times.



Prices for the lights range from \$495 for the V to \$1,895 for the III. Hypertech video housings for consumer camera/recorders range from \$459 to \$1,395.

The age of video is certainly here in a big way. We are a video generation. Even the Cousteaus are shooting video for television work now because it is much less expensive than 16mm film. With inexpensive, rugged housings wrapped around fine, state-of-the-art consumer video systems, just about anyone who dives can now be an underwater videographer. For more product information on the Hypertech line of housings and lights write to P.O. Box 10513, Pompano Beach, Florida 33062.



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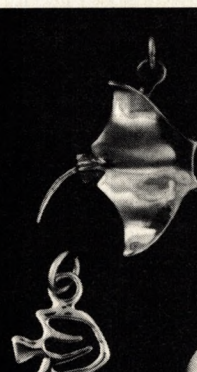
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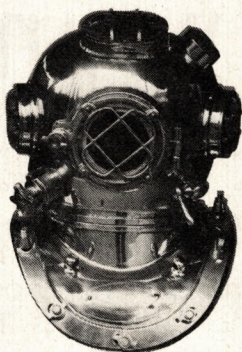
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ARM VS. GILL NETS

PADI and a coalition of other organizations and individuals concerned with natural resources have formed the Alliance for Resource Management (ARM). This is a non-profit organization dedicated to responsible management of California's wildlife and marine resources. ARM is currently seeking to bring the issue of gill net use onto the California ballot in 1988.

According to Jeff Nadler, PADI's director of field operations, and ARM's president of the Board of Directors, ARM's goal is to represent the average citizen and recreational user of marine resources. Nadler said the commercial fishing industry has a strong lobbying presence—to the detriment of the state's resources. ARM aims to counterbalance the lobby.

Gill nets not only catch fish but indiscriminately kill other sea animals including whales, sea lions and sea otters. Numerous other states have already banned their use. ARM plans to gather 600,000 signatures of registered California voters in order to place a ballot initiative in the California general election calling for the restriction of these nets.

California residents wishing to participate in this effort may contact ARM's executive director, Larry Earlix, P.O. Box 1522, Sacramento, CA 95807; (213) 836-0316.

NAUI INSTITUTE COMPUTER RESUMES

The NAUI International Diving Career Institute in the Florida Keys has added a computerized resume service for students. (The NAUI Institute trains career courses for dive instructors, divemasters and dive store or resort personnel.) The computer service will prepare a professional resume for students for distribution to potential employers. Selected mailing lists will also be made available to students for sending resumes to specific areas or types of employers.

For more information contact NAUI International Diving Career Institute, c/o Hall's Diving Center at Faro Blanco Resort, 1994 Overseas Highway, Marathon, Florida Keys 33050; (305) 743-5929 or toll free out of state (800) 331-HALL.

HANDICAPPED INSTRUCTOR COURSE

The Handicapped Scuba Association of San Clemente, California has appointed Pisces Divers, Inc. of Miami Beach as sponsor of the third HSA instructor training course in Florida. Designed to provide qualified instructors with thoroughly researched and tested hands-on techniques for guiding disabled persons in learning how to scuba dive, the three day

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

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Any experienced scuba instructor teaching a nationally recognized certification program is eligible to enroll. Information is available from the program coordinator, Lou Fead, at Pisces Divers, Inc., 1290 5th Street, Miami Beach, FL 33139; (305) 534-7710.

SENIOR SCUBA

With the assistance of Al Catalfumo, president of the Bonaire Beach Club Scuba Centre, and J.W. Whortenbury, scuba instructor at the University of Minnesota, Senior Scuba Diver's International has embarked on its charter voyage.

This charter offers the pleasure of diving with buddies near your own age and level of ability. The matchmaker will put you in touch. The matchmaker will also put you in touch with divemasters in your area who are part of the network and are willing to work with you.

At a still to be determined date, Catalfumo will host a pre-learner's sampler at Bonaire Beach Club. Charter members will have the first opportunity to sign up. There will be special package rates.

SSDI dives will be planned to world famous sites at low rates. Along with the charter membership goes a newsletter listing planned dives, member contributions, a buddy matchmaker, and a list of dive shops interested in working with senior groups. It is for those already certified as well as for the beginner eager to become part of the scuba scene.

Those older than 50, dive shop owners, dive schools and kids under 50 who want another contact can get a membership application by writing to M. Semper, P.O. Box 23212, Minneapolis, MN 55423.

DIVESITE/IDEA

Divesite, Tulsa, Oklahoma's largest scuba shop, recently became an IDEA training center. Owner Jay Smith and IDEA national training director Tom Matthes held their first ITC with five new instructors now employed at the Divesite.

The International Diving Educators Association was begun in 1952 as the Florida Skin Divers Association Scuba Training Committee. Last year, IDEA instructors trained more than 20,000 U.S. and 6,000 foreign divers.

Jay Smith is IDEA course director for the area of Texas, Oklahoma and Kansas. Lewis Elliott is instructor/trainer and Midwest field representative.

For information contact Jay Smith at Divesite (918) 664-5717 or Lewis Elliott at (918) 664-2872.



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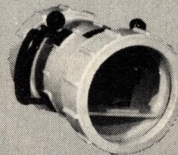


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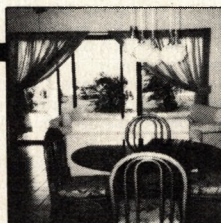
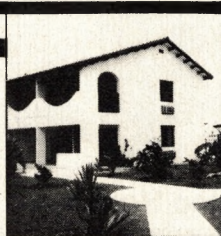
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PADI 2 MILLIONTH DIVER

When Carole Jourdan of Manitou Springs, Colorado completed her PADI open water diver course, she didn't suspect her certification would bring her a



Carl Fox, Carole Jourdan, Gary Felthager.

complimentary week in the Bahamas, round trip air transportation and a complete PADI Dive Crew Activewear wardrobe. The surprise came when PADI vice president of Education and Marketing, Al Hornsby, called to tell her she was being honored as PADI's 2 millionth diver.

Divi Hotels and Eastern Airlines joined PADI in acknowledging Jourdan. Divi has given her and her guest a week of unlimited diving at Divi Bahamas Beach Resort and Country Club/Peter Hughes Dive South Ocean on New Providence Island. Eastern is providing air transportation.

Al Hornsby also called and congratulated Gary Felthager, who instructed Jourdan, and Carl Fox, owner of the Divers Reef, a Colorado Springs PADI 5 Star Training Facility where she took the course. According to Fox, Jourdan was one of more than 300 divers his staff certifies annually.

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EDITORIAL

(Continued from Page 10)

the off-gassing times by developing a system of progressively slower ascent rates as the diver nears the surface.

Regardless of which dive computer you are using, or if you are still using the standard USN tables, it does not hurt to slow down your ascent rate. In fact, slower ascents could help you prevent the bends, particularly if you are making repetitive dives.

The major problem is that most divers have a difficult time judging their precise ascent rate—especially in open water. The best way to descend and ascend is along the dive boat's anchorline. An alternative method is to deploy a descent line from the stern. If you are diving from shore, use the bottom contour as your guide. Spend time practicing slow ascents by timing them with a watch and depth gauge or your dive computer. For years SKIN DIVER has been urging sport divers to make a *safety stop* at 10 feet for 5 minutes. Based on the most recent bubble detector research, we now recommend a slight modification to this rule. Take one minute at 30 feet, one minute at 20 feet and three minutes at 10 feet. It is the same amount of time, it is just distributed differently.

Making safety stops at three depths will automatically slow your ascent rate at the most critical part of your decompression. The safety stops should be added to your total bottom time for computation of repetitive group letters.

Another word of advice. Don't push your no-decompression time right to the limit. Start your ascent when you are within five minutes of the maximum allowable time. The same is true if you are using a dive computer.

And, while you are going through what sometimes seems an agonizingly slow ascent, just keep thinking: *Slow ascents prevent silent bubbles.*

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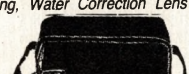
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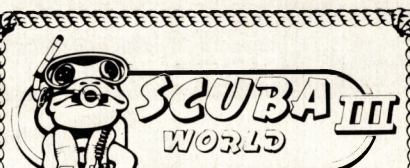
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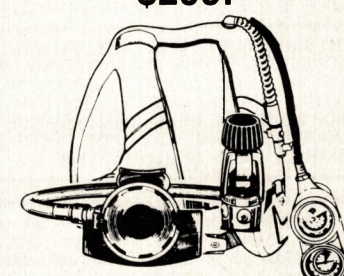
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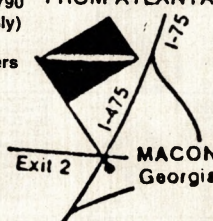
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By Sea Elite

Limited life time warranty

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- Luminous hands/dial
- Dive time bezel
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- 12/24 time
- Dual time
- Calendar
- Long life battery



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FEATURING—

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- Waterproof to 660 feet
- Depth alarm, depth recording, dive time recording
- Audible dive time alarms
- Digital stopwatch
- Luminous hands/dial
- One-way bezel, safety locks
- Calendar, depleted battery warning signal

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Two-tone Aqualand



MEN'S 200M DIVER

FEATURING—

- 660 ft. waterproof
- Swiss ESA movement
- One-way bezel
- Screw-lock crown
- Luminous hands/dial
- Stainless case, calendar
- Quality equal to Heuer and Seiko



CASIO NAUTILUS

FEATURING—

- Depth-gauge to 300 feet
- Waterproof to 660 feet
- Professional stopwatch
- Countdown dive-time alarm
- 12/24 hour time, 3 alarms
- Electronic calendar, AM/PM
- 12-digit LCD display
- Night light, long life battery



PRO 1000M DIVER

FEATURING—

- 3,300 ft. waterproof
- One way ratcheted bezel
- Screw down crown
- Luminous hands/dial
- Stainless case/resin band
- Super quartz accuracy
- 3 yr. battery



LADIES' 200M DIVER

FEATURING—

- 660 ft. waterproof, 1/4 size
- Swiss ESA movement
- One-way bezel
- Screw-lock crown
- Luminous hands/dial
- Stainless case, calendar
- Quality equal to Heuer and Seiko



LORUS LADIES ERO11

FEATURING—

- 330 ft. waterproof
- Long-life battery
- 1/100 stopwatch, calendar
- 12/24 hour time
- Daily/hourly alarms
- Manufactured by K. Hattori (makers of Seiko and Pulsar)
- Stainless case and band



TIMEX IRONMAN

FEATURING—

- 330 ft. waterproof
- 1/100 sec. stopwatch with repeat every hour
- 1/100 sec. stopwatch with repeat every hour
- Temp/daily/hourly alarms
- Calendar, 12/24 hour time
- 8 time zones, night light
- Long-life battery



CASIO DW-5400C

FEATURING—

- 660 ft. waterproof
- 33-foot shock-proof
- 7-year battery, 3 alarms
- 1/100 stopwatch
- 12/24 time, 12-digit LCD
- Countdown timer
- Night light, calendar
- 3/4 oz. case/band



CASIO TOUGHWATCH II

FEATURING—

- 330 ft. waterproof
- Withstands high/low temps.
- 5-year battery, 3 alarms
- 1/100 stopwatch
- 12/24 time, 12-digit LCD
- Countdown timer
- Night light, calendar
- 3/4 oz. case/band



CASIO TS1200

FEATURING—

- 330 ft. waterproof
- Reads temp. in F° or C°
- 1/100 sec. stopwatch with repeat every hour
- Temp/daily/hourly alarms
- Calendar, 12/24 hour time
- 8 time zones, night light
- 3/4 oz. case/band



AQUASPORT 281 FF

(Continued from Page 40)

long list of standard features, available options, Aquasport quality and a base sticker price of \$29,990 the boat becomes affordable.

Since 1964 the name Aquasport has been synonymous with the open fisherman style boats. In fact, Aquasport pioneered the open center console fishing boats and set the standard for all other manufacturers to copy. In recent years Aquasport has expanded its line of fine quality boats to more than 20 different models including cuddy cabin boats such as the 281 Family Fisherman we tested.

A combination of last year's 270 and 290 Express Fishermen, the new 281 FF cuddy cabin is ideal for a weekend adventure or a day cruise.

It has a spacious twin berth and lots of storage. You and a friend can stay aboard the 28 footer overnight quite comfortably. An overhead hatch gives access to the foredeck and provides cabin ventilation for restful sleeping. Above the berths, recessed storage bays hold plenty of personal gear and two side port-holes are conveniently located for easy viewing when the elements get bad. A manual marine toilet with holding tank

makes the 281 FF quite comfortable. The lockable cabin provides a large storage area for scuba gear or fishing tackle when they are not in use.

The overall length of the fiberglass boat is 28 feet 10 inches and it has a beam of 9 feet 7 1/2 inches. The cabin has headroom for a six foot three inch person and the deck is completely walk-around with an anti-skid texture. The hull has a dry weight of approximately 6,400 pounds. Power comes from a single 350 hp Pleasurecraft Marine engine or an optional Mercruiser 340. Add to that a 150 gallon fuel capacity and a top speed of approximately 30 knots and you will find the Aquasport 281 FF taking you a long way from the dock.

With its deep V-hull that tapers back to a 20 degree deadrise the boat is stable and dry and can hold quite a load. It could easily carry six divers with full gear. The 281 FF is quick to plane and the flat chines at the front of the boat throw the spray out and back; no salty showers on this one, just smooth dry rides.

One feature I especially liked was that the engine was amidships and the engine cover actually formed part of the cockpit floor. Anyone who enjoys space on a boat will find this feature very attractive. There is no large engine cowl at the back of the boat, so typical of most inboard motors. For divers, it means more deck space for gear bags and tanks and an

easy staging area for getting on or off the dive platform.

The standard features on the 281 FF are impressive. Few options are necessary, making the base price of the boat very close to the total investment. The 281 FF comes equipped with stainless steel bow rail, windshield with pass-through window, two swivel pedestal bucket seats and more. An optional bench seat that will seat two people can be added. For fishermen this option is ideal. The seat tilts forward and underneath it a live baitwell can be found.

The cockpit is jammed with state of the art features that include: Loran, VHF radio, fishfinder, autopilot, navigational lights and instrumentation, bilge pump, bilge blower, electric horn, power trim and tilt, tachometer, compass, temperature gauge, voltmeter, fuel gauge, drink holders and much more. There are also 30 gallons of fresh water available.

For diving, fishing or just cruising, the Aquasport product line is for the serious sportsman. The Family Fisherman series can easily take you for an extended vacation through America's inland waters or to many reefs and wrecks just about anywhere offshore. For a color catalogue on the new Family Fisherman series and other fine sport boats see your local dealer or write: Product Manager, Aquasport Boats, 7925 West Second Court, Hialeah, Florida 33014.

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U.S.TECH Package II

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I Learned About Diving From That Confusion In A Cavern

TEXT AND PHOTOGRAPHY BY KARL W. SHREEVES

I'd already been diving several years when I finally got around to taking an advanced open water class. The continuing diver education concept was newer then—besides, I didn't feel the class would teach me anything experience hadn't already. Both the class and experience had a lesson in store for me.

We did our search and recovery work and rescue training (they still taught rescue in the advanced course then) in a local lake on one weekend, then headed to Florida the next weekend to finish our training in some springs and caverns. (Note: This was in the days when it was still considered acceptable to take advanced students in caverns. Cavern diving had yet to be established as a specialty. Today no instructor would consider taking such students in any cavern!)

So far the course had been fun, but easy. My experience showed, especially among the students who had only recently completed their entry level training. Like anyone who is experienced, I found myself in a position of unexpected leadership, with much of the class "following my lead" in the drills we were practicing. The instructors trusted me perhaps a little more than they trusted the less experienced members of the class, even buddying me with some who were having a little trouble with certain exercises.

The training dives in the springs and caverns proved to be no exception. Since I was completing the exercises quickly, the instructors allowed me to bring my camera; I spent much of the time photographing limestone and fish in the crystalline water or watching my classmates perform their respective tasks. It was easy and fun—the kind of trip that can lull one into overconfidence.

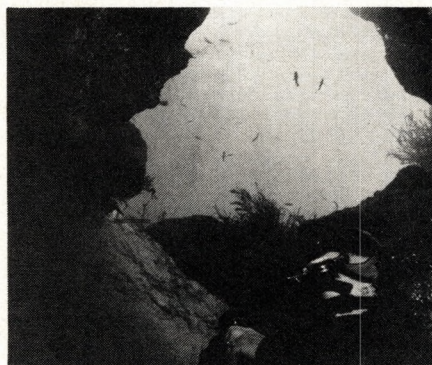
On the last dive, we were to make a short traverse through two connected caverns. We would go through in two groups of about six with the instructor, starting in one spring and coming out in the other. Since I'd been in the caverns before, I was appointed to lead the group, with the instructor in back.

The entry spring was covered with duckweed, which we slipped through quickly. As we descended through the gin-clear water, the duckweed was a glowing green cathedral ceiling that our bubbles shattered. I was to find the open-

ing to the cavern, locate the guideline and lead through.

There was one problem. Although I'd been in the caverns before, I'd never gone from one end to the other. I'd always entered at the "exit" cavern and turned around. I'd never been in the "entry" spring before. My instructor had reassured me, however, I would have no trouble finding the guideline.

I moved toward the cavern opening, an ominous dark mouth in the side of a limestone wall. With my light on, I moved into the shadow. It took a few moments to adjust to the darkness, then I was moving through a tunnel, my buddy at my side. Swinging my head right and left, I looked for the start of the guideline. It wasn't in



sight, but I proceeded because such lines often start inside.

Something didn't seem right. I felt something was missing. My sixth sense bothered me, but I couldn't figure it out. Checking my air, I paused and looked behind. The other students were lagging but following. My buddy and I swam a few yards farther into the darkness.

The bottom was silty and I had to use extreme caution to keep from stirring it up. It was finer than the silt in most springs. Then I realized that silt isn't usually this fine because there is a current to carry it off. Suddenly, I knew what was wrong. There was supposed to be a current. Since there wasn't, we must be in the wrong tunnel!

I flared my arms to stop my buddy and keep anyone from passing me. Almost immediately the instructor came clawing past the others to me shouting "Out! Out!" into his mouthpiece. Silt swirled,

wrapping us in a muddy cloud. Our lights glowed a dull orange in the non-existent visibility. Maintaining my flared arm posture, I moved back toward the exit so no one could pass me going the wrong way into the tunnel.

With no twists, turns or side passages, I trusted my sense of direction. The exit was deeper and my ears told me I was headed that way. Suddenly I was in the clear green glow of the basin. Although I'd been calm and unworried during the incident (although irritated with myself for letting it happen) the instructor was not, evidenced by his counting our group four or five times in a row.

After a brief moment on the surface, we re-descended and completed the dive without incident. I left the water having learned several lessons:

1. Although I never felt myself in any danger, I learned the potential hazard a cavern has. Even within the light zone, silt can destroy visibility. In other circumstances, the same event could have been catastrophic. A few years after this, the first cavern specialty was introduced, confirming what I'd learned. If you're not trained for caves and caverns, *don't go in them.*

2. Several of the students who had followed me into the tunnel later told me they knew it was the wrong way, but thought I was staging some kind of drill at the request of the instructor. When you're in a position of leadership, voluntary or not, remember your actions can affect others as well as yourself. Trust is often very blind.

3. Something had been bothering me: the absence of a current I instinctively knew was supposed to be there. As you dive, your mind and body become attuned to the conditions encountered underwater. If something doesn't feel right, trust your sixth sense and get out.

4. After diving as long as I had without any incidents, it was easy to begin believing I was immune to diving accidents. No one is. Only being alert and using good judgement keep you safe. No dive, no matter how familiar, should be "routine."

Today, as an instructor myself, I often relate the above story to my advanced open water and rescue students. My point is experience is the best teacher—but *preferably someone else's!*

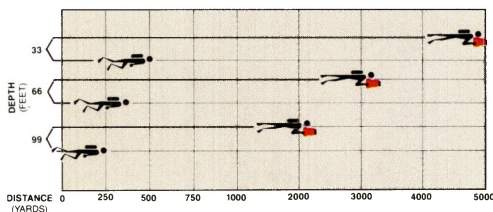
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A woman with brown hair and blue eyes, wearing a black one-shoulder top, is holding two diving instruments. In her right hand, she holds a black circular console with a red button and a white label that says 'TUSA'. In her left hand, she holds a pink regulator with multiple gauges and a pressure gauge. The background is dark and textured.

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